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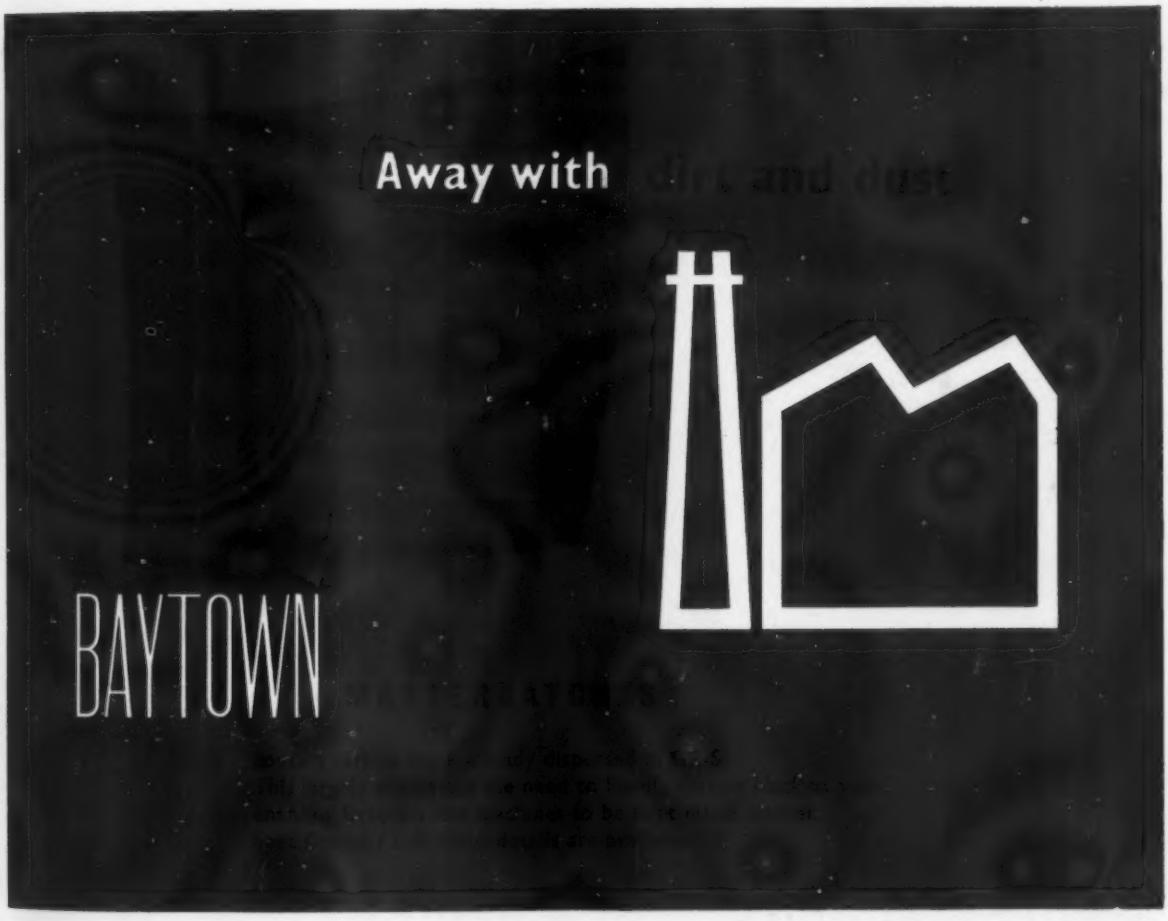

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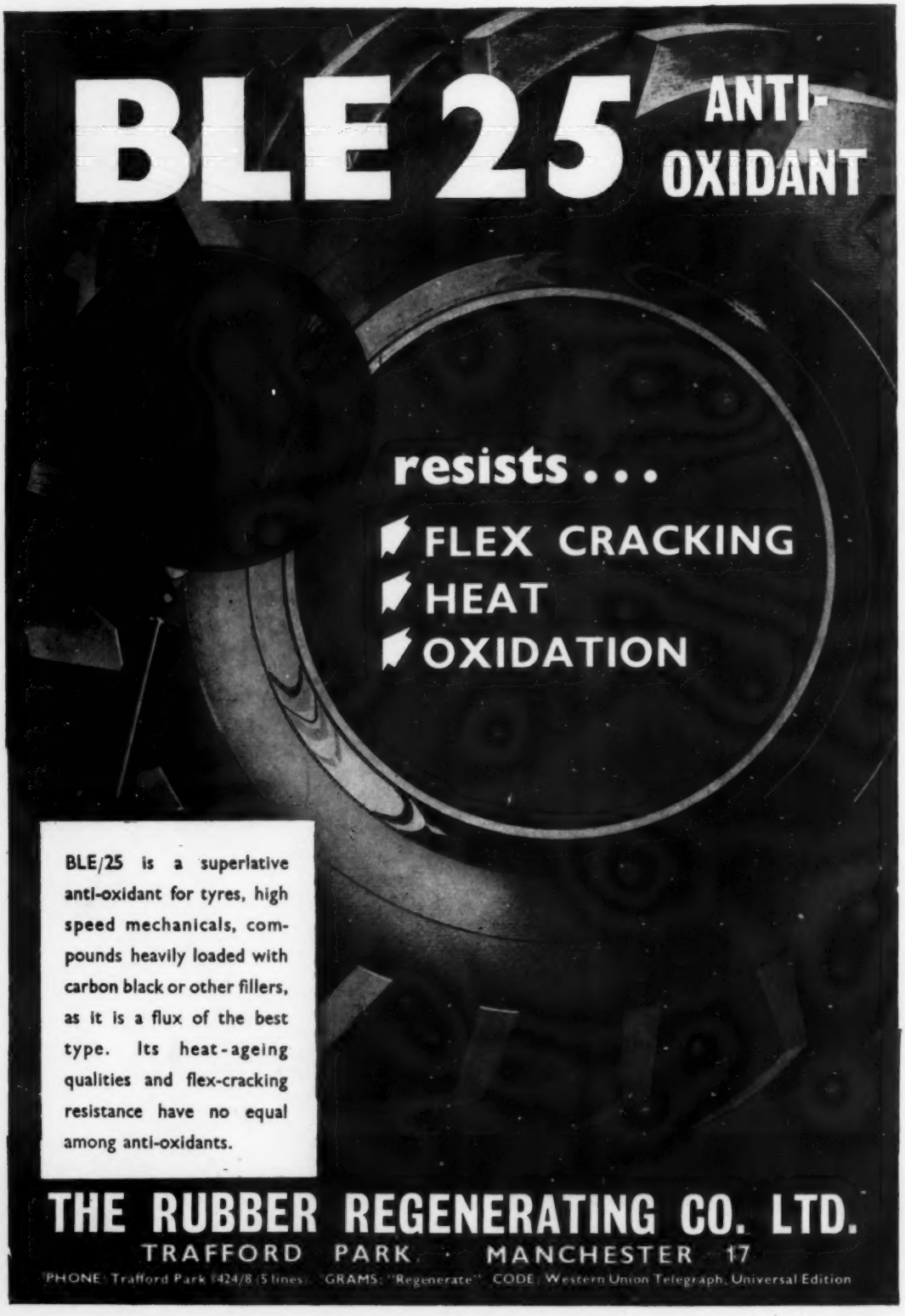
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IN ITS 76th YEAR

September 26 1959

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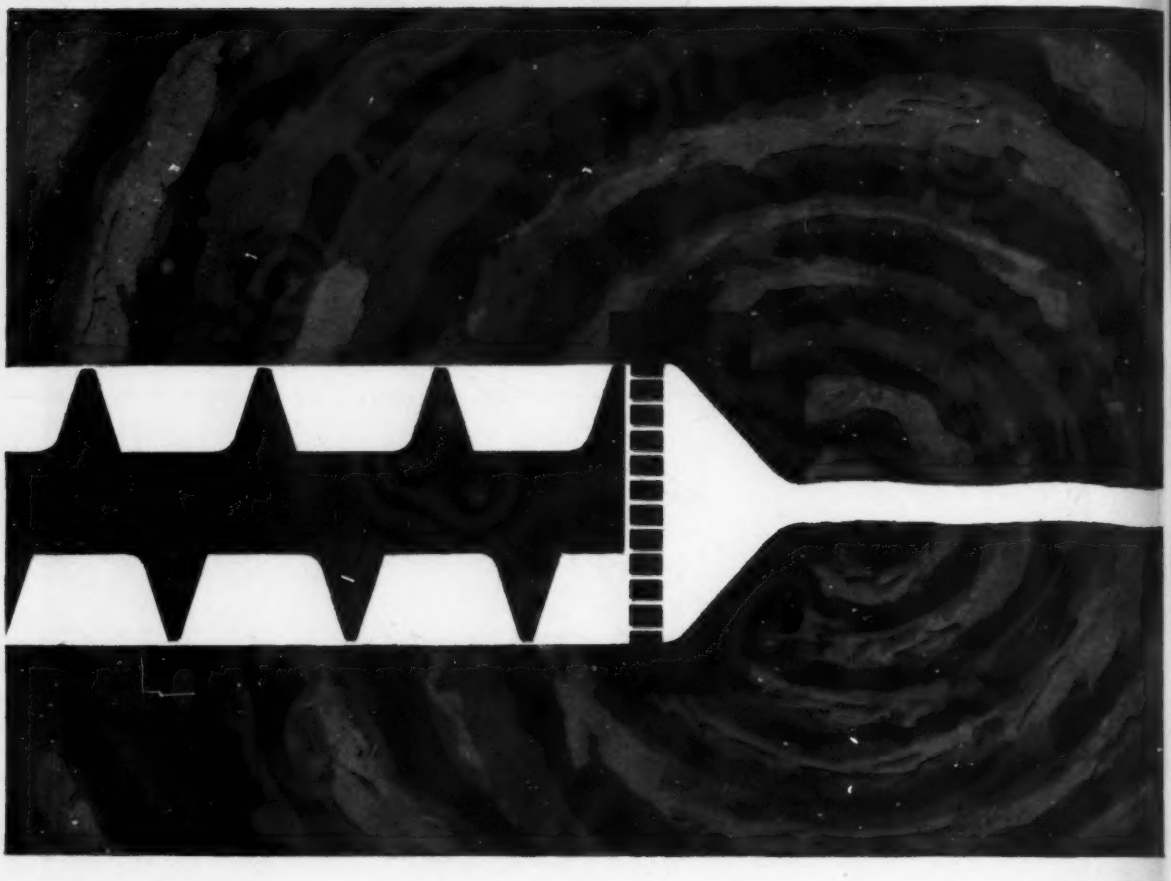

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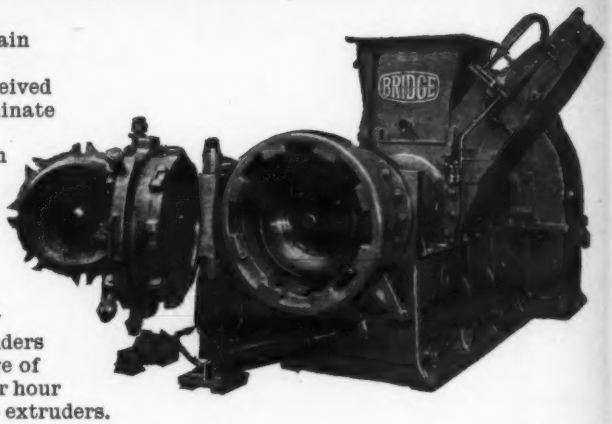

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NOTES of the WEEK

Carelessness

THOSE invaluable 'reminders' issued by the Accident Prevention Committee for the Rubber Industry continue to appear. Their excellent and forceful style, and the fact that they are published with such regularity, must eventually, as water wears away a stone, improve the industry's already good safety record. Number 44, the latest, is the first on a theme of 'Carelessness,' It reads: 'The man who sincerely claims he has never been careless will abandon his claim as soon as he does a little thinking. Has he ever smacked his thumb with a hammer when he intended to hit a nail? Did he ever cut himself because the knife slipped? Did he ever skin his knuckles because the spanner slipped off the nut? Did he ever drop something heavy on his feet because his hold was insecure?—and a host of other simple questions. Events like these fall within any man's experience. Generally the results are trivial—but not always. One man lost a finger because he scratched it on a rose bush in the garden and the wound became septic. Another was pricked by a spine on a Christmas tree. He died. Sepsis again. Carelessness, of course—but it is so firmly a human quality that we must say a little more about it.'

The Modern Apprentice

FASCINATING facts about the typical industrial apprentice of the mid-twentieth century were revealed by a survey conducted among 400 apprentices from all over Britain who attended the annual Industrial Welfare Society apprentice conference at Oxford earlier this month. A voluntary, anonymous questionnaire was given to each apprentice whose ages were between 17½ and 22 years. Answers showed that fathers' jobs varied greatly, ranging from senior managers to labourers, from ministers of religion to turf accountants. £1 to £2 a week is spent on entertainment and personal purchases by nearly 40% of the boys. Half of them spend less than £1 a week on their clothes. Just over 20% spend between £1 and £2 a week on clothes. Most have money saved: 40% of them up to £50, nearly 20% between £50 and £100, nearly 20% between £100 and £250, and more than 5% over £250. Half the apprentices have life insurance policies; nearly half have Post Office savings accounts; more than a quarter have bank accounts; another quarter have trustee savings bank accounts. Only 7% hold Premium Bonds. Nearly 20% own cars; 60% own bicycles; 30% own scooters or motor-cycles. 35% go to church regularly. Nearly 60% do not belong to a trades union, but only 20% do not belong to a youth or sports club, Scouts, cadet force, Territorial Army or other organization. Although 40% say they would like to emigrate, 45% say definitely that they would not emigrate. Almost 5% are married; 17½% are engaged and nearly 30% declare that they are 'going steady.' 40% went to a secondary grammar school, 30% to a secondary modern school, some 20% to a secondary technical school, 30% expect to be promoted to supervisor, but only a few more than 10% expect to rise to be executives. Half the apprentices expect to stay with their present employer at the end of their time, and about 15% more to stay at least for a while.

Stockpile Decision

LAST week's Board of Trade decision to release 100,000 tons of natural rubber from the UK stockpile has not exactly been received with pleasure in Malaya. Commenting on the Anglo-American moves in their weekly review of the Singapore rubber market, Messrs. Holiday, Cutler and Bath, a leading broking firm, say that the timing of the Board of Trade's announcement was unfortunate because it looked as though Britain and the USA had made a bilateral agreement to the detriment of Malaya. The review adds: 'If, however, current rumours are correct that a "floor price" of about 95 cents is to be fixed, below which the Board of Trade will not sell, then this at first looks good on paper, but floors in the past have had an unfortunate habit of becoming ceilings.'

Plastics to the Rescue

THAT well-worn phrase about the 'ill wind' looks like earning use again through the current water shortage in many parts of the country. The 'good' may come because the drought—some districts had had 38 days without measurable rainfall—is bringing rather rapidly to the attention of Water Boards up and down the country the existence, and desirability of, plastics piping. From Devon to Yorkshire, miles and miles of polythene pipes are being rush-laid. At Cheadle, Cheshire, five miles of plastics pipe was laid in five hours to bring an additional 500,000 gallons a day to the drought-stricken area. In Devon, three miles of pipe have been laid to link an underground lake with the main supply and saved 60,000 people from what were described as 'desperate straits.' When the rains come and the emergency pipelines are removed or reeled up, it is to be hoped that water department engineers will be encouraged to look further into the vast possibilities of plastics in water pipe projects of all kinds.

NEWS *Briefs*

ITALIAN PIPELINE — PUNCTURE-PROOF TYRE
SWISS AND JAPANESE IMPORTS — GOODRICH
BRAZILIAN PLANT — INDONESIAN FINANCE

●**Italy**—A five-mile long pipeline, made of polythene pipe, is being built near Trento, Italy, for collecting milk in mountain pastures and bringing it down to a central co-operative plant. The pipeline originates at two points about 5,000 feet high and will carry the milk down into the valley at the rate of 4 tons per day. It crosses rivers and valleys and one lap is suspended for over 1,200 feet.

●**Australia.**—Vacuum Oil Company Pty. Ltd. has called for tenders for the construction of the first synthetic rubber manufacturing plant in Australia, Mr E. A. Jones, the company's managing director, has announced. A number of construction companies have been asked to tender on the contract.

●**Philippines.** — General price increases were put into effect on August 17 on products sold in the Philippines by the Goodrich International Rubber Co. Company assistant manager F. J. Johnson has said that the price increases were made necessary because of the rising cost of raw materials and the recent revisions of the Philippine tax structure.

●**Brazil.**—The B. F. Goodrich Co. expects to inaugurate its factory in Campinas, Brazil, in October. Production capacity will be 1,000 tyres and 1,000 inner tubes a day. The firm will install another plant six months later for the production of plastics.

●**Dominican Republic.**—The firm of Celso Perez C. por A., which specializes in tyre-retreading, has invested $200,000 in a new footwear producing unit. Production has commenced with a range of tennis shoes and is to be extended to include other types of rubber shoe. The president of the firm, Sr. Celso Perez, states that other rubber products will be introduced following an intensive study tour of Europe which he is undertaking.

●**Malaya.** — The Malayan Estate Owners' Association has suggested that a mission should be sent overseas to find ways and means of expanding the Malayan rubber trade. The Association decided to ask the Rubber Producers' Council to agree to this step at a meeting on September 24 to counter any effect of the release of rubber from stockpiles in the UK and the US.

●**Indonesia.** — Indonesia and the Soviet Union have extended their rubber contract, Antara news agency reported on Saturday last. The contract originally called for Indonesia to deliver 14,000 tons of No. 1 and 2 RSS to the Soviet Union this year. The agency said this had since been extended by between 1,000 and 1,500 tons. The Ppn-Baru (new Government estate enterprise) has also signed a contract with China for the delivery of 1,000 tons of rubber monthly, Antara added.

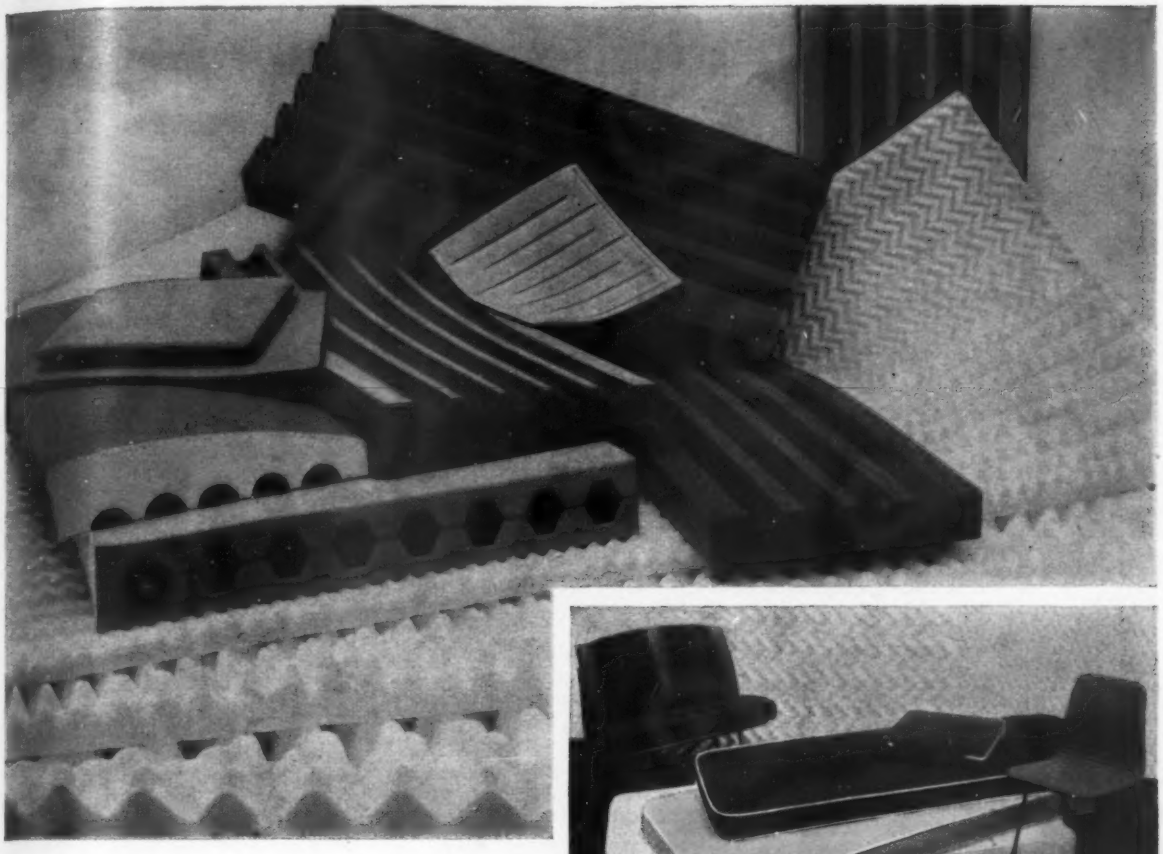
●**Switzerland.**—Swiss rubber imports (including waste) in August totalled 554 metric tons compared with 936 tons in July and 528 tons in August 1958, according to the Swiss Customs Directorate. Main sources of supply in August were the US with 226 tons, Malaya with 169 tons and West Germany with 70 tons. Swiss imports of rubber in the form of sheets, strips, balls etc. (without fabrics or metal parts attached) totalled 107 metric tons against 138 tons in July and 69 tons in August 1958. Imports in August included 67 tons from West Germany, 14 tons from Malaya, nine tons from France and five tons from the US.

●**Western Germany.**—A Flensburg engineer, Mr Paul Schmidt, claims to have invented a puncture-proof tyre, according to the West German weekly news magazine, Der Spiegel. The tyre, foam rubber with independent airtight cells encased in a normal outer cover, is fitted to a special wheel-rim, which can be tightened to apply pressure on the tyre to harden it.

●**Indonesia.** — Indonesia's devalued banknotes will be withdrawn from circulation from January 1 1960, according to a Presidential decree issued in Djakarta over the weekend. The banknotes involved are the 1,000 and 500 rupiah notes which lost 90% of their face value in the Government monetary reforms of August 25. They will cease to be valid after the beginning of next year. All railway companies in Indonesia have been nationalized following the Government takeover of the DSM (Deli Spoorweg Maatschappij) Company.

●**Japan.** — Japan imported 11,957 long tons of crude rubber in July, compared with 11,741 in June. Of the total, 8,580 tons came from Malaya and 135 from Indonesia, according to the Japan Rubber Importers Association. The total amount of natural latex imported during July increased to 1,369 from 998 in June. Malaya supplied 1,276 tons and Indonesia 89. Synthetic latex imports dropped to 279.4 tons compared with 364 in June. The total included 263.2 tons from the US and 15.5 from the UK. Styrene-butadiene rubber (excluding latex) imports in July totalled 3,220 and other synthetic rubber imported during July amounted to 944 tons.

'None of these damn moulders seem to know how to spell'—451



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Synthetic Rubbers in Cables—6

SILICONE RUBBER AND MISCELLANEOUS TYPES

By W. S. PENN, B.Sc.

Previous articles in this series, which is concluded in this issue, appeared in RJIP August 22 and 29, September 5, 12 and 19.

THE outstanding synthetic rubber which has not been covered by the present series of articles is silicone rubber. It holds a very important place in the cable industry and although consumption is only measured in terms of a few hundred tons, its value in financial turnover is high. Other synthetic rubbers to be considered include Hypalon, Viton, chlorinated butyl, the acrylonitriles and their combinations with PVC. All of these play a certain part in cable production and one or two of them may eventually achieve quantity usage.

Silicone Rubber

It is not proposed to deal with the compounding of silicone rubber in this article. Virtually all the material used in the cable industry is purchased in compounded form. And perhaps this is wise because the dangers of contamination, which must be avoided at all costs, are high in a cable factory dealing with such a large variety of materials.

A problem in dealing with silicone rubbers is the nomenclature which should be used. Both manufacturers, Imperial Chemical Industries Ltd. and Midland Silicones Ltd., employ different symbols for their products, which is perhaps necessary since similar grades do not necessarily correspond to each other in all their properties. It would be very nice to have the same practice as with SBR where a 1500 polymer has a definite meaning. In the meantime, individual nomenclatures must be used. Fortunately many of the characteristics of silicone rubber are common to all types and this approach will be used wherever possible.

Uses

There are three broad classes of application for silicone rubber. The two biggest are silicone cables for the Admiralty and Tersil cables for aircraft.

Both of these types have various combinations of silicone rubber and glass and are meant for high temperature application. Moreover, they are expected to continue to operate in the event of a fire, made possible because silica, the decomposition product of the silicone rubber, is non-conducting.

The Admiralty specification for their cables includes a most interesting test known as the 'Gas Flame Test.' In it a length of cable (with current passing through) is heated to a temperature of 750° C by means of a series of gas jets. The test continues for a period of three hours during which time the cable must continue to operate.

Silicone insulated cables are used for a variety of other applications. Normally advantage is taken of the high ambient temperatures at which the material can be used. It is considered that silicone rubber will operate continuously at 150°C although it is appreciated that it will operate for considerable periods up to 200°C.

The uses envisaged are generally hot spots. Such places as boiler rooms, by the sides of furnaces, in bakehouses and so on are ideal situations for silicone cables.

In addition to making use of the higher ambient temperatures, it is also possible to increase the current rating of a given cable. In this respect the use is similar to that of butyl rubber, although the temperature differences are much greater.

Choice of Material

There is a wide variety of silicone compounds offered by both manufacturers. To discuss all of these would merely be repeating manufacturers' data sheets, so that it is only proposed to consider those in general use in reasonable quantities.

The materials used in the cable industry may be divided into two main groups. There are those which need an 'after' cure and those which do not.

In the first group a suitable insulation grade is MS.50 (Midland Silicones) and DP.146 (I.C.I.). These have a Shore hardness of 50 and are good all round materials. If harder stocks are required MS.80 and DP.147 are suitable.

For stocks with improved phsyical characteristics (still requiring an after-cure) MS.916 (Midland Silicones); DP.54 and E.372 (I.C.I.) are to be recommended. These types can be used as insulation but in certain cases they may also be used as sheaths.

The stocks which do not require an after cure usually have slightly inferior physical and ageing characteristics to the types quoted above. They may be used where the temperatures involved are not quite so high. Suitable types are MS.157, E.370 and EP.142.

Processing

All catalysed silicone stocks should be stored in as cool a place as possible. Before use a brief milling on a cold mill is required and the stock thus prepared will be suitable for use for a few hours afterwards. If the stocks are kept on the mill for more than a few minutes extensive sticking is likely to occur.

The watchword for silicone rubber processing, whether at the mill or at the extruder is cleanliness. Mills and extruders must be thoroughly cleaned before use. It is also advisable to have covers on benches and to use polythene wrappers. When milling in colours good dispersion must be achieved.

Extruders must be kept as cool as possible to avoid scorching. Most types of extruders can be used and the rubber should be well consolidated at the feed end. Normally the 'set' cure is achieved by CV and care should be exercised in handling the extruded product at this stage. Speeds and curing temperatures (up to about 200°C) may be varied within reasonable limits.

In giving the final cure, air circulation is the most important factor. The oven should have air circulated through it regularly and the coils of core should be kept well apart, otherwise reversion will occur. After-cures up to 24 hours at 250°C are recommended, but shorter times and lower temperatures can be used successfully.

Mechanical and Electrical Properties

Normal insulation stocks after the second cure have tensile strengths varying between 700 and 1,000 psi. A full cure is required to develop maximum hardness. Unfortunately the tear resistance is low, in the region of 10lb./in. Nevertheless there

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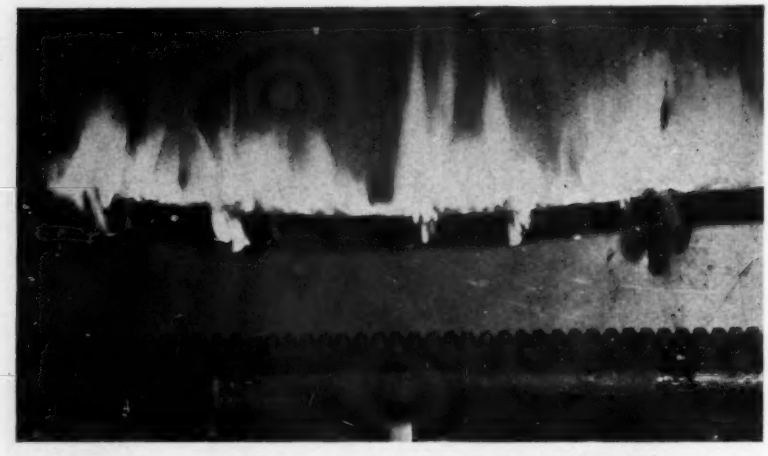
seem to be few difficulties in using a material of this type.

The insulation/sheathing grades with improved physical properties, have tensile strengths between 1,200 and 1,500 psi. In such cases the tear strengths can vary between 20 and 50lb./in. This is clearly a considerable improvement and the materials offer great promise as sheathing types.

The ageing properties are very good with continuous operation of at least 150°C. The properly cured



Gas flame test for silicone cables, Johnson and Phillips Ltd.

materials will operate for very long periods at 200°C and much shorter periods at 250°C (no more than a few weeks).

The electrical properties of all the materials are quite good. An SIR in the order of 2.0 x 10^{15} ohm. cm. is quite possible. Moreover, both the dielectric constant and power factor are low and the materials are suitable for high voltage work.

The water resistance of silicone compounds is reasonable, and about the same as natural rubber. Resistance to steam is not generally good but improved grades are available. Solvent resistance in general is not good and frequently it is necessary to apply some form of protection to silicone insulated cables.

Hypalon

Compared with PCP there are two main advantages in using Hypalon in the cable industry. The first and most important is improved heat resistance and the second is the bright colours which can be obtained with Hypalon stocks.

Which of these properties is required decides the basic curing combination to be employed. Two practical cable stocks, illustrating the two systems are given in Table 1.

The first cure is based on magnesium oxide and the second on litharge. Both give best results when additional accelerators are used and dipentamethylene thiuram tetrasulphide is particularly effective. It should be appreciated that the accelerator system can be varied within reasonable limits to give varying properties. All compounds need an organic acid, for which Stabelite resin has been used in the compounds in Table 1.

Filler and softener can be varied within very wide limits to suit individual requirements. Quite satisfactory products can be obtained with fairly cheap white fillers. Considerably higher tensile strengths can be achieved by using reinforcing white or black fillers.

TABLE 1

Hypalon 20	100.0	100.0
Magnesium oxide	15.0	—
Litharge	—	35.0
Stabelite resin	2.5	2.5
Stearic acid	0.5	0.5
Antioxidant	1.5	1.5
Paraffin wax	3.0	3.0
Process oil	8.0	8.0
Calcined clay	50.0	50.0
Whiting	50.0	50.0
MBTS	0.5	0.5
Dipentamethylene thiuram tetrasulphide	2.0	2.0
Min. cure at 141°C.	45	45
Tensile strength, psi	1,200	1,410
Elongation, % minimum	280	240
Geer aged (28 days at 100°C.):		
Tensile strength, psi, % original	95	97
Elongation, % original	92	90

Compounding of Hypalon 20

An antioxidant has been used in the mixes in Table 1 since it is expected that most cable stocks will be used at high temperatures. White fillers have also been used in the mixes to allow coloured stocks to be made, although these can only be produced with magnesium oxide.

The ageing properties of Hypalon are such that it can be used for continuous operation at 100°C. (See Figure 1). It can also be used for quite reasonable periods at 120°C. The material does not have particularly good insulation resistance, but it is better than PCP and good enough for most purposes. Hypalon can also be used as a high temperature sheath, although the comparatively high price will limit its use to a certain extent.

Viton

Viton is too new to indulge in any detailed descriptions of processing and compounding techniques. However, Table 2 gives details of a mix made to check the properties claimed for the material.

TABLE 2

Viton A	100.0
Magnesium oxide	15.0
Whiting	30.0
Diak No. 1	1.6
Min. cure at 141°C. and 12 hr. at 200°C.	35
Tensile strength, psi	1,800
Elongation at break, %	270

Viton A Cable Compound

A standard press cure was given followed by an oven cure at a higher temperature. The period in the oven can be increased to 24 hours with a little advantage.

The tensile properties, even with a non-reinforcing filler are quite good. The use of reinforcing carbon blacks considerably improves these properties.

One of the outstanding characteristics as far as the cable industry is concerned, is heat resistance. It is too early to say what its continuous operating temperature is, but it will certainly operate for long periods at 200°C. and for a considerable time at even higher temperatures. Its electrical properties are also very good and the compounds in Table 2 gave an SIR of 2 x 10^{15} ohm. cm.

Viton is very expensive and clearly will be a special purpose material. However, it can be cheapened by compounding to a certain extent and will probably compete with PTFE for some applications. It has the advantage over PTFE of being compounded on conventional rubber equipment which will probably give cheaper cables than equivalent types in PTFE.

Chlorinated Butyl Rubber

The Enjay MD-551, or chlorinated butyl rubber, is a most interesting development. Perhaps its most

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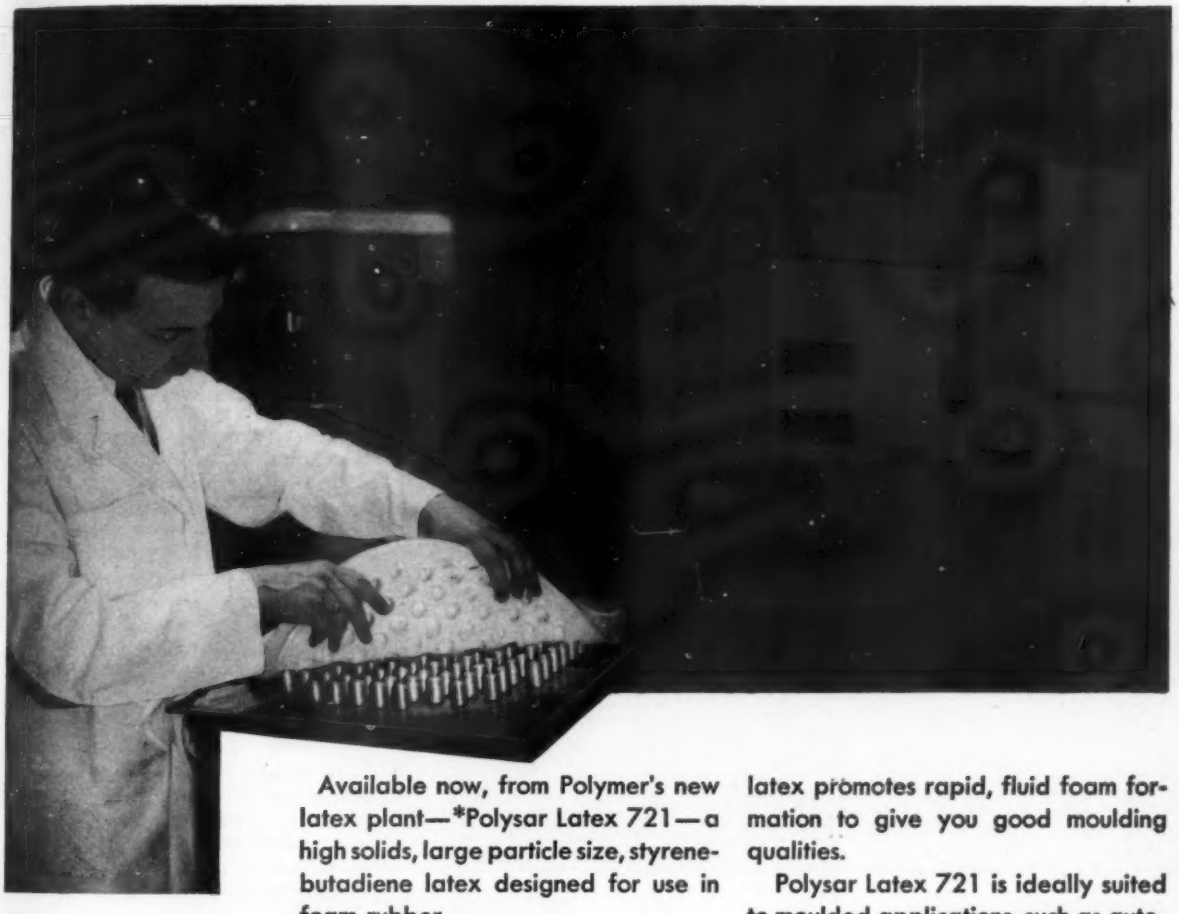

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valuable characteristic compared with butyl rubber is its ability to vulcanize when mixed with natural rubber and SBR. This means that combinations of these polymers are possible to give intermediate properties and costs.

The compounds are mixed in much the same way as ordinary butyl compounds although precautions may have to be taken. Some stabilization is necessary (with magnesium salts for example) and scorch is worse than with butyl and magnesium oxide helps in this respect.

Although MD-551 cures with zinc oxide alone, it is best to use sulphur and various butyl accelerators to give the highest speeds. In any investigation a simple test is to take the conventional butyl curing system whether dibenzo GMF or MBTS/ZDC and replace all or part of the butyl with MD-551. The only change need be the addition of 1-2 parts magnesium oxide. Quite useful results may be obtained in this way. It seems likely that the more effective the curing system the better the results and the addition of TMT helps considerably.

The best tensile properties are, of course, obtained with mixes well loaded with carbon black. Values in excess of 2,000 psi may be obtained which is better than straight butyl compounds. The ageing appears to be somewhat better than butyl, but ozone resistance may not be as good, although it can be varied considerably by compounding. Electrical properties of white stocks are very good.

Acrylonitrile Rubbers and Blends with PVC

Straight acrylonitrile rubbers are not very much used in the cable industry. They need only be employed where really first class oil resistance is required. It is quite possible to cure by CV and a suitable sheathing mix is given in Table 3.

In Mix No. 1 the TMT may be increased and the MBTS decreased to give improved ageing. Such a mix gives very good extrusion properties and it has the advantage of being treated from all points of view in much the same way as a rubber mix.

Blends of acrylonitrile rubbers with PVC are acquiring great interest in the cable industry, particularly as sheathing mixes. It is far too early to say what place they will find in the industry, but they do have many interesting properties.

Mix Nos. 2-4 in Table 3 are only given as guides. It is possible to vary the fillers over a very wide range to give an equally wide range of properties. Quite high tensile strengths and tears (40-70lb. per in.) can be achieved. Clearly the cost has to be taken into account so that reasonably high loadings of cheap fillers may be required.

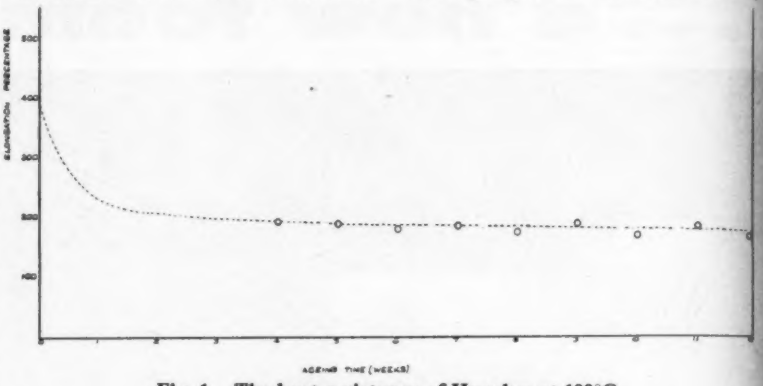


Fig. 1. The heat resistance of Hypalon at 100°C.

These compounds are not PVC plasticized with acrylonitrile copolymers in the sense that they are regarded as thermoplastics. They are vulcanized and normal acrylonitrile compounding techniques may be used. The ageing results achieved are very good. Processing presents few problems. At some stage in its history, the PVC component should be gelled, but apart from that, normal rubber equipment may be used. Very good extrusions are obtained.

Although these combinations have been known for some time, the compounding variations possible are so great that really little is known about the subject. Much work requires to be carried out to achieve optimum properties and to study the ageing characteristics of the materials in detail.

TABLE 3

Acrylonitrile Compound and Blends with PVC

	1	2	3	4
Butadiene/acrylonitrile 85:15	100.0	—	—	—
Butadiene/acrylonitrile 70:30	—	100.0	100.0	100.0
PVC polymer	—	66.0	66.0	66.0
Zinc oxide	4.0	4.0	4.0	4.0
Antioxidant (PBN)	2.0	—	—	—
Stearic acid	0.5	0.5	0.5	0.5
FEF black	25.0	—	—	25.0
Fine particle silica	—	50.0	25.0	—
ACC	20.0	—	—	—
Whiting	—	—	25.0	25.0
TTP	12.0	50.0	50.0	50.0
MBTS	1.5	1.2	1.2	1.2
TMT	0.5	0.3	0.3	0.3
Sulphur	1.5	1.5	1.5	1.5
Min. cure at 155°C.	30 (at 141°C)	25	25	25
Tensile strength, psi	1,780	2,700	2,100	2,150
Elongation, %	360	480	550	540
After Geer ageing (15 days at 100°C.):				
Tensile strength, % retained	—	120	110	113
Elongation, % retained	—	91	85	84

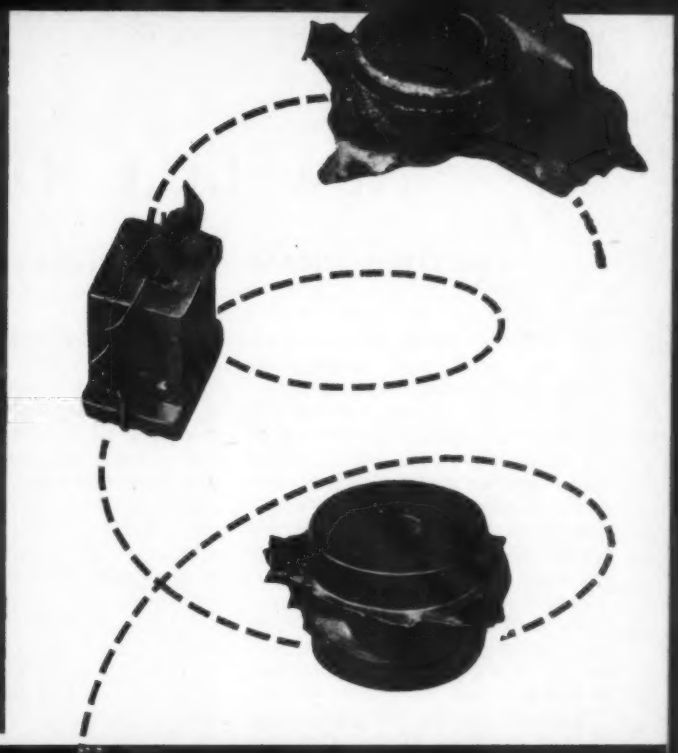
Conclusions

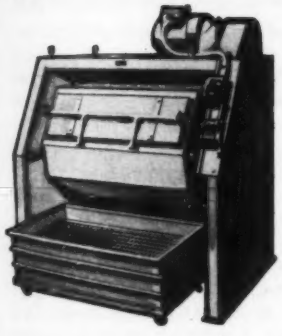
Six articles have been presented on the use of synthetic rubbers in cables. In spite of this it has only been possible to give an outline since the subject is so vast. Much compounding work requires to be carried out in all fields before the cable industry can feel really satisfied that it has the materials it needs.

With one or two exceptions the elastomers have been discussed as individual materials. First, only one or two polymers have been described in each 'family' whereas there are many Neoprenes, SBR types, butyl polymers, silicone rubbers and so on. Second, very few blends have been discussed. Hypalon and chlorinated butyl can be mixed with quite a number of other polymers so that the possibilities are very large.

It is hoped that the articles have shown that the cable industry is a virile one and fully alive to the responsibility it has to examine and develop new materials. There is no doubt that the next few years will bring some remarkable changes which cannot but help industry as a whole.

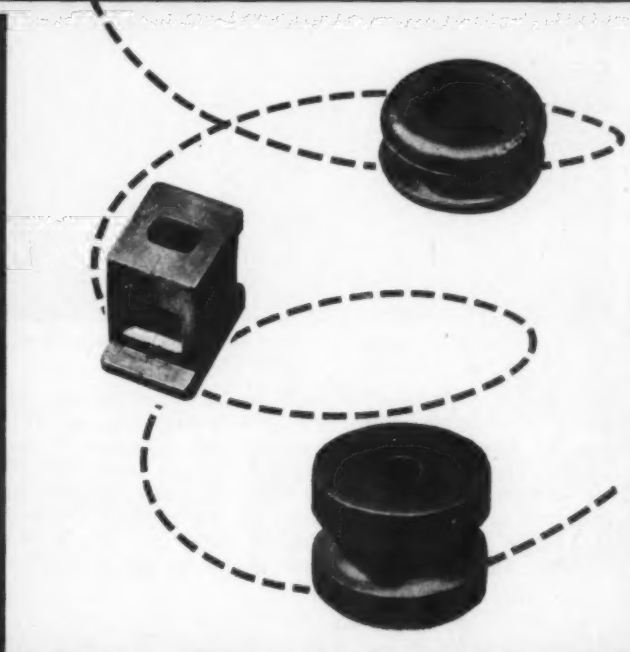
De-flash small rubber parts with 'DRIKOLD' in the Columbian International Sub-zero Tumbler





Sub-zero tumblers are obtainable from Columbian International (Great Britain) Ltd., 116 Cannon Street, London, E.C.4.

De-flash by freezing



When small rubber components are frozen in a rotating drum with 'Drikold'—I.C.I. solid carbon dioxide —flashes become brittle and the tumbling action breaks them off. Sub-zero de-flashing with 'Drikold' can cut costs, speed processes, increase production. I.C.I. Technical Service staff will advise on problems and will de-flash sample batches of components on request.

ICI

IMPERIAL CHEMICAL INDUSTRIES LTD LONDON SW1

New I.C.I. Olefine Plant

FURTHER PHASE IN INTEGRATED PETROCHEMICALS PLAN

WITH the coming on stream of the third, and largest, oil cracker at Imperial Chemical Industries' Wilton Works, the I.C.I. complex at Billingham and Wilton, on the north and south banks of the River Tees in north Yorkshire, becomes the world's most comprehensive centre of petrochemical industry outside the USA, and the largest anywhere based on liquid feedstock. Together, the sites total 3,100 acres, 2,000 at Wilton of which 600 have been developed. The two plants employ 28,000 people, 10,000 of them at Wilton.

The new cracker, the third olefine plant of the Heavy Organic Chemical Division, raises I.C.I.'s total olefine capacity by 60%. Output of the chief product, high purity ethylene, is currently 110,000 tons a year which can be readily increased to 140,000 tons a year. The three plants are at present consuming between 550,000 and 600,000 tons a year of light naphtha feedstock.

Some 90% of the ethylene is piped to the neighbouring plants of the Company's Plastics Division for the manufacture of Alkathene (I.C.I. grades of polythene). The remainder goes to Heavy Organic Chemicals Division's nearby plant for conversion into ethylene oxide. Part of this, converted to ethylene glycol, goes to the Fibres Division plant, also at Wilton, for the manufacture of Terylene. I.C.I. Dyestuffs Division, among others, uses ethylene glycol for making a variety of products both at Wilton and Huddersfield. Propylene of 95% purity is the next most important product. Part of this is pumped under the Tees to Billingham for the manufacture of isopropanol and butanols. Part, further refined to high purity propylene, will be pumped to a new plant under erection at Wilton by the Plastics Division for making Propathene (I.C.I. grades of Polypropylene) in quantities of about 10,000 tons a year, although sufficient propylene can be made for a very much higher output. Other primary products of the olefine plants are methane, ethane, 'tail gas' consisting of hydrogen and methane, butylenes plus butadiene, gasoline of high octane number and fuel oil. The butadiene plant at Wilton produces about 14,000 tons of butadiene a year, some of which goes to make Butakon synthetic rubbers at Plastics Division's neighbouring plant and some to synthetic rubber manufacturers.

The impressive Number 3 olefine plant was shown to the technical Press last week on the 10th anniversary of the opening of Wilton. Essentially, the Number 3 plant, which can handle nearly 250,000 tons a year of feedstock, employs the same process for ethylene production as has been used at Wilton since 1951. This is an oil pyrolsis process developed by the M. W. Kellogg Company of New York which achieves cracking at low partial pressures and low residence time in the reaction zone, and thus ensures the conversion of the maximum proportion of feedstock into gases containing the maximum amount of olefines and particularly of ethylene. The plant, designed in collaboration with I.C.I. and constructed by Kellogg Corporation divides broadly into two sections: the pyrolsis section, where the feedstock is converted into a mixture of gases and crude motor spirit and the product separation and purification section.

The battery of free piston gas generators which are a novel feature of the new olefine plant

Kellogg Pyrolsis

In the Kellogg method of pyrolsis, in which most of the heat of pyrolsis is supplied by mixing hot hydrocarbon vapour with steam at a still higher temperature, the major part of the pyrolsis occurs in a length of internally insulated pipe (the soaker) which leads to the quench devices. Here the reaction is 'frozen' after a contact time of the order of only one second. One of the advantages of the steam pyrolsis method is that the ratio of steam to hydrocarbon can be varied, making possible some flexibility, in particular in the ratio of production of ethylene to propylene.

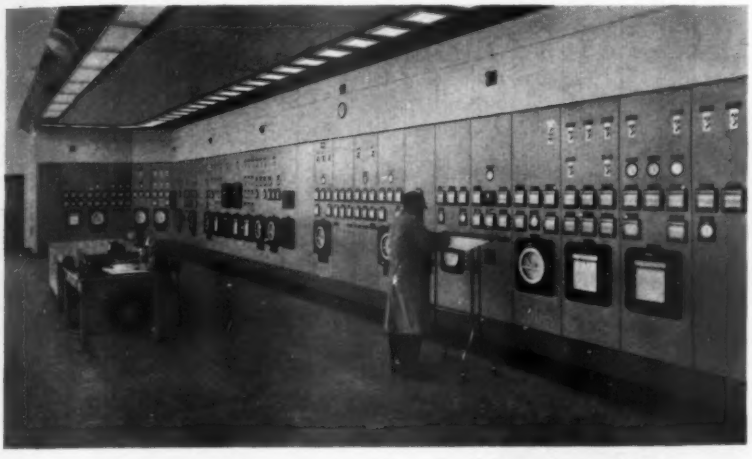
The Pyrolsis section of the No. 3 plant consists of three independent parallel systems. Each of these has its separate tubular oil heater, burning 9-10 tons an hour with temperatures of about 670-700°C., tubular steam superheater, temperature 900°C. plus, soaker line and quench boiler.

In the latter, 250 psig steam is generated as the reaction is quenched. The independence of each system provides valuable flexibility in regulating pyrolsis conditions at different rates of naphtha feed.

The products of pyrolsis then enter the primary fractionator where the small amount of heavy polymeric oil is separated from the gas and crude petrol and used subsequently as fuel oil. The steam is also condensed at this stage and separated.

The gas and crude petrol proceed to the gas separation section. This is sub-divided into a compression unit

for process gas and refrigeration purposes; a purification unit where hydrogen sulphide, water, and acetylene are removed from compressed process gas; a warm fractionation system where petrol and butylenes plus butadiene are separated; and finally a train of fractionating columns operating at low temperature



Control room for gas separation and refrigeration sections

in which the remaining light hydrocarbon products are separated.

As in the Numbers 1 and 2 plants, separation of the methane, ethylene, propylene and ethane from the purified gases is achieved by low temperature refrigeration and fractional distillation under medium pressures, but certain modifications are incorporated in the third plant. Refrigeration is provided by a propylene compression system and by a two-stage ethylene compression system in cascade with it. Finally, in order to reach the lowest temperature required for separation of methane and lighter gas, instead of a further stage of refrigeration compression, the methane product is let down in pressure and evaporated.

Free Piston Gas Generators

Undoubtedly one of the most unusual and interesting features of the plant is the battery of free piston gas generators which drives the turbines for the centrifugal gas compressors. Thirteen of these engines, each giving 1,000 h.p. are usually operating at one time. Their simplicity, and the fact that they run with high efficiency on low grade fuels makes the installation an economic power source.

There are two control rooms on the Number 3 site, both of them neat, streamlined, starkly efficient and pressurized to obviate any risk of vapour accumulation. Here are temperature, pressure, level and flow controls but—further evidence of the comprehensive safety precautions—no process materials are led into these rooms; the opening and closing of valves being done by distant control. In the three olefine plants there are altogether 36 continuous and fully automatic analysis instruments transmitting their readings to recorders in the control rooms. Non-dispersive infra-red spectrometers of British and American manufacture are used extensively for the analysis of simple mixtures of light hydrocarbons. For more complex compositions and low concentrations, a chromatograph or an instrument employing chemical analysis is used. In addition to automatic analysers, a considerable staff is engaged in the laboratory on analysis concerned with control of the unit and the checking of product purities.

Although some 150 people are employed overall, the Number 3 plant itself is operated on four shifts each of only 13 people. Numbers are governed more by strict considerations of safety than for operational necessity.

Indeed, as in all I.C.I. plants, great attention is given to matters of safety. In the case of the olefine plants, with regard to fire hazard, the low temperature fractionation sections are surrounded completely by fire walls from which a blanket of steam can be laid to disperse any large leakage of hydrocarbon vapours.

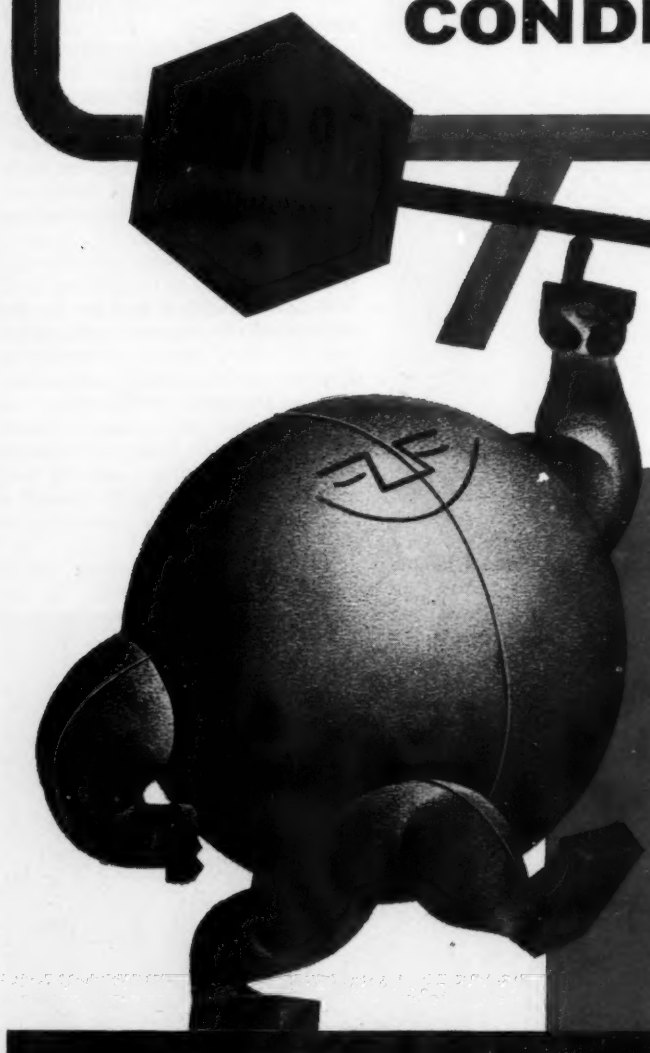
Wilton

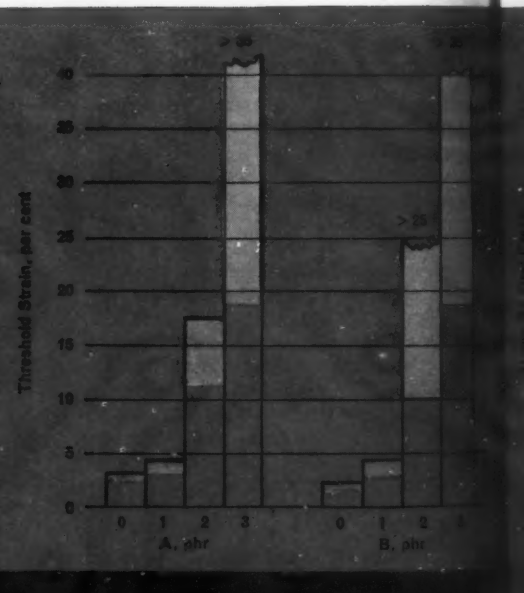
Wilton was chosen as a site for the olefine works for a number of reasons, chief of which were its proximity to deep water—for incoming tankers and outgoing products; to Billingham—to whose plants the gaseous intermediates obtained from the feedstock could be easily piped; and the fact that there was plenty of room for olefine-producing and olefine-using plants.

Wilton itself is not an I.C.I. Division. It is operated by a Council composed of six resident directors and a managing director, Mr R. E. Newell. Any of the 11 Divisions of I.C.I. can build and operate plants

General view of overhead condensers in association with primary fractionator and soaker lines

how can rubber be best protected against SEVERE OZONE CONDITIONS?





The two charts, above right, show results of tests made to determine antiozonant requirements of SBR stocks when subjected to stress at increasing ozone levels.

40 pphm ozone

120 pphm ozone

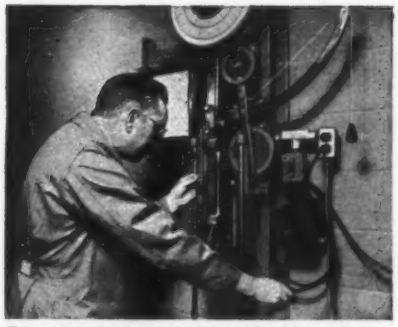
CHART A—Chart above shows effects of increasing antiozonant content of SBR stocks to meet increasing ozone level.

severe conditions of ozone and stress call for extra-special protection . . .

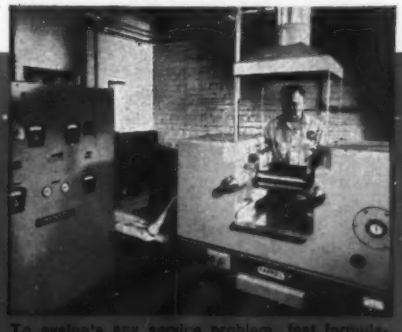
Smog which may contain up to 100 pphm ozone is hard on health and disposition. It is equally hard on rubber products. High ozone levels cause severe cracking in rubber formulations. In addition, stress also contributes to this problem as shown in Chart A, below left. How do you prevent such deterioration, assure long service life for your product under severest service conditions?

First, use antiozonants UOP 88 or 288, which offer maximum ozone protection. A relatively small loading of these low-cost antiozonants goes a long way in providing increased protection. Chart "B", for example, shows that 2 phr of antiozonant provides ample protection at an ozone concentration of 40 pphm, while an increase from 2 to 3 phr more than compensates for a 200% increase in ozone concentration.

Ozone concentration is but one of many factors to consider in manufacturing antiozonant-containing rubber products. Our staff of specialists, backed by UOP laboratory facilities and field experience, will be happy to discuss your problems with you. Simply write or telephone our Products Department.



Every day we test a number of rubber recipes. The Scott Tester is used to measure physical properties of an experimental vulcanizate.



To evaluate any service problem, test formulations are carefully compounded in this rubber mill by trained UOP technicians.

UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

CHART B—Results of tests of two sets of samples containing varying amounts of antiozonants. Each were subjected to ozone concentrations of 40 pphm and 120 pphm. Note that an increase of 2 to 3 phr antiozonant proved adequate for the greatly increased ozone level.

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at Wilton and take advantage of the comprehensive service facilities available include a very fine training centre.

It is obvious that a great deal of careful planning has gone into the general layout of the area and the siting of the various plants built and building. Wide, twin carriageways, one of them aptly known as Double-Bond Street, cross the site from north to south and east to west. Eventually there will be three of these main roads in each direction. Between the one-way roads—there are in all 20 miles of roads, 16 miles of railways—broad trenches carry service and process pipes. Immediately flanking the main roads, on the wide verges, are canteens, medical, administration and service buildings. The production plants themselves, such as the three oil crackers, the Alkathene plants and the Propathene plant now going up, are placed well back on side roads. This positioning of productive units is a feature that should minimize any tendency towards overcrowding in the future.

Since 1949, over £120m has been spent at Wilton, half of it since January 1956, and further development continues.

H.O.C. Division

The Heavy Organic Chemicals Division, formed in 1958, is the newest I.C.I. Division and is a limited company, being a wholly owned subsidiary of I.C.I. The chairman is Dr S. W. Saunders. Mr K. W. Palmer and Mr D. M. Bell are joint managing directors and others include Mr J. D. Brown, engineering director; Dr C. Cockram, production director; Dr J. W. Woolcock, technical director and Mr T. B. Clark, commercial director.

The Division, which has a works on each side of the River Tees, linked by pipe lines under the river, now produces some 40 products (based entirely on petroleum) with many more, such as, for instance, propylene oxide and propylene glycol, under development. About 50% of sales, which are rising steadily, are to other I.C.I. Divisions. External UK customers take some 40% and exports the remainder. When indirect exports are taken into account, it is estimated that not less than half the Division's products go to export markets. The Division has set up bulk storage depots in Belgium, Holland and Switzerland and sends bulk shipments to many other countries.

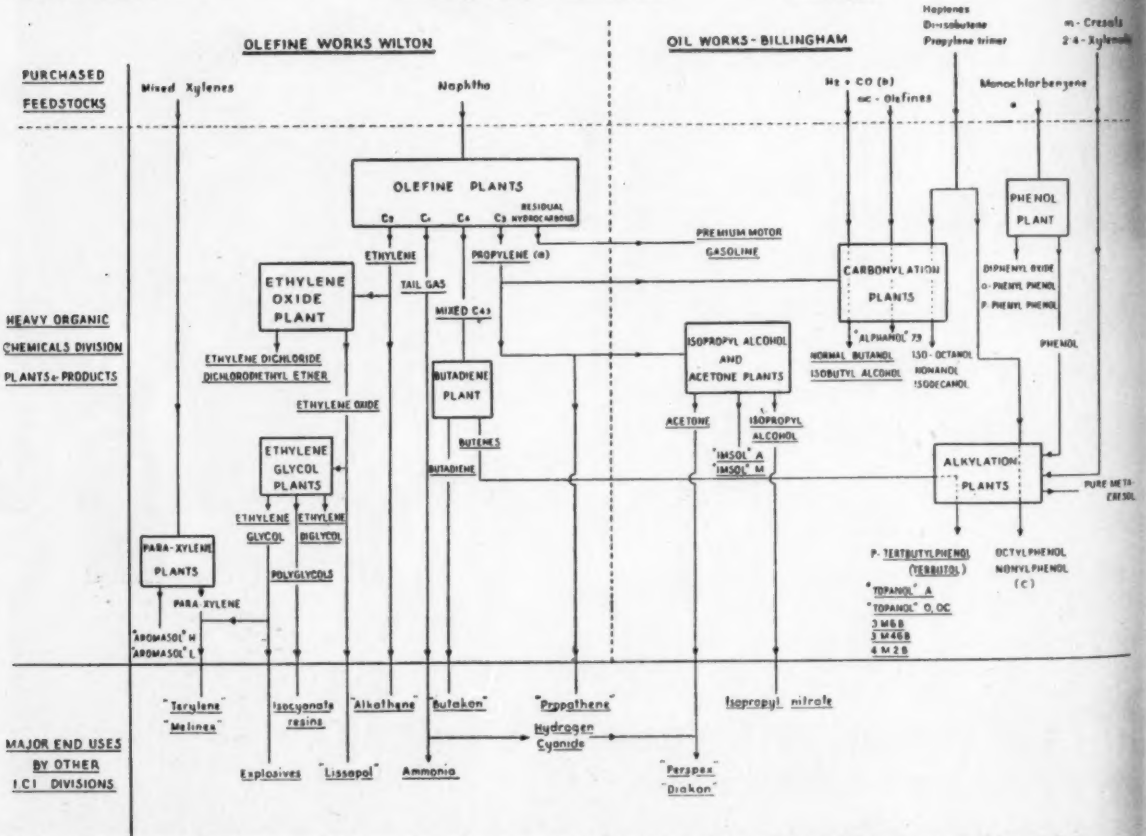
French Butyl for UK

ISR SOLE AGENTS

THE International Synthetic Rubber Company Ltd., Hythe, Southampton, was recently appointed sole agent in the UK for Société du Caoutchouc Butyl (Socabu) who are now in full production of six main standard grades and three non-staining grades of Socabutyl.

The £5m Socabu Plant, at Notre Dame de Gravenchon between Rouen and Le Havre, is designed to produce at least 20,000 tons a year of butyl rubber in the main standard grades (S34, S27, S24, S14, S04, S26) and three non-staining grades (N34, N27, N14). These grades differ according to their degrees of unsaturation and by their Mooney viscosity.

Mr G. T. Day and Mr W. F. Gough have been appointed to the Board of Bukit Tupah Rubber Estates and Mr Day has been appointed chairman. Mr H. F. Copeman and Mr H. C. Le Neve-Foster, who were directors, resigned following the successful offer for the capital by Contanglo Banking and Trading.



Main products and processes of Heavy Organic Chemicals Division, their relationship to the olefine plants and to other main Company products. H.O.C. products are in capital letters and divisional plants are boxed. Products dependent on olefine plants are underlined

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VIEWS and REVIEWS

Influence of Degree of Polymerization

IN the April 1959 issue of the *Transactions* of the *Journal of the Textile Institute* (vol. 50, *4*, 311-334) there appears an important paper by R. J. E. Cumberbatch and W. G. Harland (British Cotton Industry Research Association, Shirley Institute) on 'The Influence of Degree of Polymerization and Molecular Orientation on the Mechanical Properties of Molecularly-Homogeneous Monofilaments.' This paper represents *Part VIII* of the series dealing with the 'Degree of Polymerization and its Distribution in Cellulose Rayons.'

Method

The synopsis mentions that molecularly-homogeneous fractions of secondary cellulose acetate (DP 100-800) were spun into monofilaments, and after stretching the latter to obtain different degrees of orientation, they were saponified to cellulose filaments, and the latter tested (*cf. original for details*). Some measurements were also made on cellulose acetate filaments.

Inference

It is stated that:

'By taking into account molecular orientation, it is shown that degree of polymerization is a much more important factor influencing the properties of rayons than previous published work with films has suggested.'

(The paper referred to above includes 23 Figs., and an Appendix with two elaborate tables and 26 references to the literature.)

Prospects for Synthetic Fibres

In an interesting editorial note (pages 179-180) in the *Proceedings* of the *Journal of the Textile Institute* (corresponding in issue date and volume to the above reference to the *Transactions*), with caption 'Prospect for Synthetic Polymer Fibres,' happenings in 1958 in relation to specific materials and prospects thereof are discussed. The general situation is neatly summed up thus:

'These growing markets for the newer fibres will mean more competition for the older and natural products, since expansions in production facilities already completed or scheduled are greater than can be offset by an increasing population or a rising standard of living. On the other hand, the increasing number of fibres available will mean increased competition among the newer fibres themselves. This will continue until the various markets for the different types have been determined on the basis of price, properties and promotion, and not all the newer fibres will be equally successful.

'In conclusion, then, in the light of the expected improvement in the textile trade generally, a further growth in the consumption of synthetic-polymer fibres is confidently expected during the coming year.'

White Pigments

In *RJIP* for August 29 there was among the 'Notes of the Week' one headed 'Exhibition Mania.' I am wondering whether a similar note might not be written about 'Symposia.' The increase in the latter both here and in the United States during the past two or three years has become (at any rate to this chronicler of events and developments) almost frightening. A few recently reported on here—taken at random and from memory, covering symposia so-called, or series of articles on the same subject at, say, annual meetings of learned or technical societies—include rubber *v.* plastics; ozone cracking and testing; carbon blacks; polyurethanes; etc. etc.

Is this multiplicity of symposia and the like an expression of the galloping advance of elastomer and plastics technology, for instance, or possibly of the difficulty of disseminating the newly acquired, and often most important knowledge, within reasonable time?

Frequently it happens that papers of, possibly, major importance are published as much as two years or even more after reading or presentation, and a delay of a year or so is quite common. *Rubber Chemistry and Technology, Rubber Abstracts,* and a few other publications, struggle manfully with the problem, but it is still there, and this may be the reason—without its being recognized directly, as such—for the waxing interest in symposia.

However, whatever the explanation of the constant appearance of the symposium phenomenon, I propose to make a few remarks on another (and interesting) example of the manifestation, namely, one which came about at the spring meeting of the Akron Rubber Group, and was reported on in *Rubber World* of May 1959 (p. 267) and in *Rubber Age,* May 1959 (p. 275).*

White Pigments

The said Akron spring meeting on April 3, as *RW* puts it, 'developed some interesting information as a result of the symposium on "Inorganic White Reinforcing Agents and Fillers".'

Briefly the various points made were based on the *RW* report, as follows:

V. H. Vodra (Rubbermaid Inc.), who was the programme co-ordinator, urged the adoption of descriptive group names for calcium carbonates of various particle sizes;

C. A. Carlton (J. M. Huber Corpn.) emphasized that the particle size and the shape of rubber-grade clays are of major importance to the compounder;

Ralph F. Wolf (Columbia Southern Chemical Corpn.) made the point that there is no fundamental or chemical reason why silica cannot be made as good as carbon black for reinforcing rubber compounds;

E. E. Whitted (Faultless Rubber Co.) explained the merits of calcium carbonates for drug sundries in addition to their low cost; and

R. S. Havenhill (St. Joseph Lead Co.), reviewed the composition, properties and uses of talc, mica, barytes, titanium dioxide, and zinc oxides.

*The recent printing delay accounts for the lag of reference here!

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

Non-Black Compounding

I cannot do more here than mention a few special points in the individual papers. Thus:

Mr Vodra in his paper made the following suggestions (in connexion with calcium carbonates) for group names and particle sizes:

Ultra-fine	under 0.1 micron
Fine	0.1 to 1.0 micron
Medium	1.0 to 3.0 microns
Large	over 3 microns

In a paper on 'Clays for the Rubber Industry,' amongst other interesting matters, Mr C. A. Carlton, dealing with the properties imparted to rubber compounds by kaolin clays, said that these were dependent on the shape of the particles, 'whose thickness is much less than its length or breadth, and percentage of particles in the finer-than-two-microns and coarser-than-five-microns range.' In tabular form the author showed the particle size distribution range of rubber-grade clays from soft to the hardest of the hard, as follows:

PARTICLE SIZE DISTRIBUTION

	Soft	Hard
Finer than two microns %	50-55	87-92
Coarser than five microns % ...	25–30	3–5

It should be noted, as the author pointed out, that the terms 'Hard' and 'Soft' clays are used only in the rubber industry, and refer to the properties imparted to a rubber compound rather than to the properties of the clay as such. Mr Carlton's paper covers a more complete exposition of some aspects of clay compounding, etc., than I remember to have seen elsewhere.

'Silicas and Silicates' were described by R. F. Wolf. It was explained that the reinforcing silicas are produced either by the wet process in which silica is precipitated from a water-soluble silicate, or by a thermal dry process. It was also mentioned that the thermal silicas have a particle size of 0.015 to 0.020 micron, the range for precipitated silicas being 0.22 to 0.224 micron.

With regard to cost, the following quotation from the *Rubber World* report is interesting: 'An important difference between the thermal and precipitated silicas is the cost of production, and as a result, the former sells for 67 cents a lb. and the latter for 8¼ cents a lb.'

White v. Black

An opinion by Mr Wolf as recorded in the *RW* report on the comparative compounding values of silica and carbon black was that 'There is no fundamental physical or chemical reason why silica cannot be made as good as carbon black for reinforcing rubber compounds. . . . From the physical standpoint, reinforcing silica already has a particle size somewhat finer than that of HAF black, and, chemically, the silicas have extremely active surfaces. Also, reinforcement depends not only upon the pigment, but on the elastomer.' This is followed by a considerable discussion on comparative properties and by a summary, and this will be read with, I think, considerable interest in an important and, I think, in some respects, an intriguing subject.

Notes

The literature recently issued by I.C.I., includes a 58-page brochure entitled '"Alloprene"—A Chlorinated Rubber,' profusely illustrated, and which is attractive and notable for the variety of uses discussed. Thus, in an introductory section with the caption 'Where it is used,' the references are to paints, textile finishes, adhesives, paper coatings and printing inks. As regards paints, 'Alloprene' formulations, to suit the particular applications 'are used wherever conditions are severe,' *e.g.* on concrete, asbestos, and masonry buildings, and on steelwork, machinery, ships, waterworks, roads and swimming pools. In textile finishes outstanding resistance to fire, water and weather are mentioned. In adhesives '"Alloprene" is widely used as a constituent of contact adhesives for bonding plastics, rubber and ceramics,' and in this section high bond strength, water resistance and non-inflammability are referred to. Coming to the paper trade, it is stated that 'Alloprene' is being used increasingly in paper coatings 'because it gives a non-toxic film with high resistance to water vapour,' and, in printing inks, 'Alloprene' is used 'for making specialty inks.' In this regard reference is (*e.g.*) made to alkali-resistant inks for printing soap wrappers, and to fast-drying, rub-resistant inks for high-speed rotogravure printing. As regards the *History* of chlorinated rubber, the Introduction sums this up succinctly in the following sentence:

'Natural rubber was first chlorinated experimentally almost a century ago, but film-forming properties of the product were not recognized until 1915, and although commercial production of the solid resin in quantity began about 1930, the most rapid development in the use of chlorinated rubber has taken place during the past ten years.' The future of chlorinated rubber certainly seems to be bright, and the descriptions and photographs in the brochure of jobs carried out by various firms with chlorinated rubber paints, strike me as impressive. Indeed, as regards the future the I.C.I. brochure says: 'Although certain applications are firmly established, there is continuing exploration of new uses.' As regards potential new users, if I may so put it, the brochure remarks: 'In the following pages the fundamental properties are given and the basic principles of formulation are discussed. Lastly, some typical starting formulations are given to assist users in the development of compositions to meet their own requirements.' In addition to this brochure, it is stated in a covering letter that a pamphlet entitled '"Alloprene" in Adhesives' is also available.

PHILIP SCHIDROWITZ

Industrial Art Competition

Students who are attending art and technical, etc., colleges and who intend to take up industrial designing as a career are eligible for entry into the 1959 Industrial Art Bursaries Competition, organized by the Royal Society of Arts, John Adam Street, London, W.C.2. Bursaries amounting to more than £4,300 will be offered for designs in a number of materials including acrylic sheet and laminated plastics. Subscribers to these two sections, respectively, are Imperial Chemical Industries Ltd., and Bakelite Ltd., both of whom have donated £150. The closing date for entries is October 12 1959, and further details of the competition can be obtained from the Bursaries Officer at the RSA.

Questions Corner—84

(Second Series)

355. There is a class of thermosetting polymers prepared by interacting epoxy resins and certain polyamides. Give details.

356. What toxic hazards are associated with certain thermoplastics?

357. What effect have glass fibres on the cure of silicone resins?

358. Asbestos is used for plastic reinforcement. Give some details.

(Answers next week)

Answers to Questions Corner—83

351. A comprehensive investigation on the electrical and chemical effects of β-radiation on polystyrene, and other polymers, has been reported in JACS, 1955, *77*, 847.

The electrical conductivity of dielectrics under β-radiation is thought to be primarily due to the radiation-produced ion pairs. If one assumes that the ion pairs are formed at a rate proportional to the rate of energy dissipation in the dielectric, and that they re-combine according to second order kinetics, a relationship can be found between source intensity, dielectric thickness and limiting voltage.

The electrical conductivity of polystyrene, Teflon and polythene was studied under β-radiation by measuring the passage of β-particles through the dielectric. The limiting voltage obtained was directly related to the conductivity of the system.

Polystyrene if irradiated by β-particles degraded if air was present, but further polymerization occurred if air was excluded. Bombardment of polystyrene in a helium atmosphere by deutrons caused considerable cross-linkage.

Regarding radiation chemical effects it was shown that the rate of polymerization depends on the square root of the radiation intensity. In the presence of air the rate of degradation varies with the limits of the square root and the first power of the radiation intensity.

352. The higher viscosity of Nylon 6 compared with some other types of nylon enables a build-up of pressure in extrusion. This characteristic can be used for a special extrusion moulding method, details of which are given in USP 2,697,854.

The end of the extruder is connected to a feeding device. In line with the extruder is a revolving head which rotates round the axis. Within the feeding device is the supply tube which branches into two channels. One forms an overflow with a safety valve, the other passes the molten material to the mould.

While one mould is being filled, another, already filled, is being cooled, both of which have respectively a heating and cooling device. This arrangement permits continuous moulding cycles.

The original patent should be consulted for full details.

Essentially centrifuge casting involves putting a weighed amount of the nylon granules in a revolving horizontal tube, heated with gas liners. Better quality products are, however, obtained by pouring the molten polyamide into vertical revolving tubular moulds. Heating and cooling cycles required to be adjusted for each product.

353. One method of casting plastic film from the base monomer takes as the starting material a liquid monomer which solidifies by polymerizing within a mould. Casting sheets of most monomers between plates of glass is usually carried out at moderate temperatures, and at atmospheric pressures.

In preparing a casting mould, two sheets of glass, plate or tempered glass is best, are carefully cleaned and dried and then placed face to face and spaced the required distance apart by means of a gasket. The gasket can be plasticized PVC or metal covered with paper or cellophane, but the latter has the disadvantage that it has to be removed during polymerization owing to the shrinkage undergone by the monomer.

The glass plates and gasket are then clamped together, with one end being left open for the introduction of the monomer. It is filled by pouring through a funnel, being careful to avoid the introduction of air bubbles. The whole assembly is now transferred to a warm oven and the resin allowed to polymerize.

The moulds are then cooled and the glass plates removed from the plastic sheet which should be optically clear and ready for use without further processing.

354. One method for the quantitative determination of the degree of branching (methyl content) is given in J. Pol. Sci. 1956, 19, 353.

Essentially, the method involves the use of a calibration curve prepared from hydrocarbons of known methyl content. Because of the importance to the calibration of having a hydrocarbon with a methyl content approximately equal to that of the polymers to be measured, the hydrocarbon n-$C_{54}H_{110}$ was prepared, and its synthesis is given.

The contents of a series of polythenes were determined and the results correlated with some physical properties of the polymers. A quantitative relationship is shown between the crystallinity of a polymer, as measured by the density, and the degree of branching.

A qualitative relationship between molecular weight and branching, and between mechanical properties and branching are also shown.

(More questions next week)

Plastics Institute Examinations

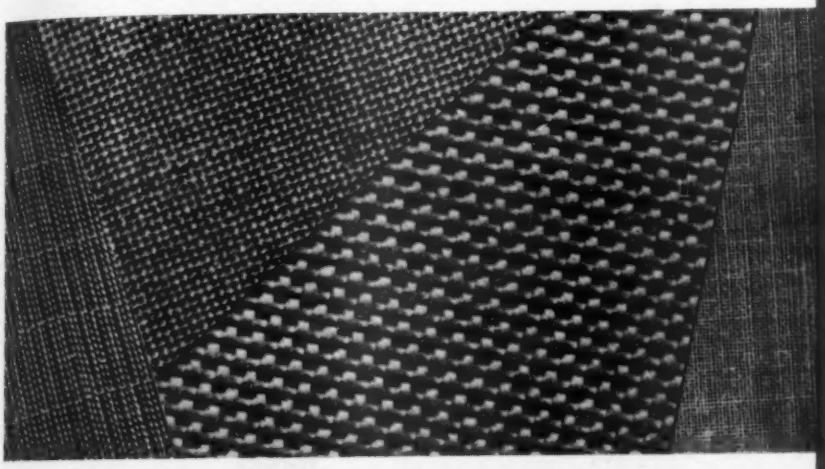
Candidates who have completed the educational requirements for the associateship, graduateship and for the diploma are as follows: Associateship: D. R. Bannister, H. S. Edward, J. Foster, R. E. D. Fox, B. H. Gregory, M. J. Littlewood, J. Pritchard, R. M. Scarisbrick, W. B. L. Small, J. E. A. Williams. Graduateship: A. G. Eades, J. O. Frogg, G. W. Gilby, S. C. Kothari, D. H. Latham, B. W. Sneddon. Diploma: J. B. Askew, C. J. Barker, P. Barrand, F. E. Bassford, D. H. Brooke, T. H. Carr, S. E. Collyer, R. Czerniawski, J. R. Davidson, R. G. East, G. Foote, A. E. Gedge, J. H. Golden, D. W. Green, I. Guakil, D. A. Hall, P. J. Hill, P. J. Judd, C. Lee, J. E. Loible, J. W. Longley, M. Mabbs, J. McFadyen, K. J. McSweeney, A. Radcliffe, A. Rutherford, J. Y. Seevaratnam, G. R. Sothern, J. A. Thomson.

ISR Latex Plant

A new plant designed to produce 2½m gallons of general purpose synthetic rubber latex per year for use in foam rubber products is now under construction at the Hythe, Southampton, plant of the International Synthetic Rubber Co. The new extension will add some 10% to the existing 70,000-ton capacity of the main plant.

'Chemical Carboy — a driver of one of those bulk liquid containers'

TEXTILES *FOR THE* RUBBER *AND* PLASTICS INDUSTRIES.....



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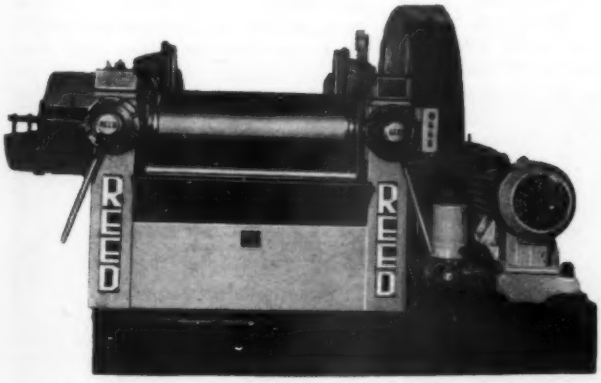

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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

I HAVE been hearing—and reading—of an interesting and significant incident in industrial relations which occurred last week, and which should give everybody hope of a new orientation in the collaboration of masters and men. It occurred at the large works at Oldbury (Worcestershire) of BIP Chemicals Ltd. where over 800 men are employed.

I understand that there was every indication that the workers were going to carry out their threat to walk out in support of a claim for an improved bonus rate which, if implemented, would have affected not merely those directly involved, but a total of 2,000 workers. Deadline was reached late in the evening on Thursday of last week, and the stoppage was due to become effective an hour or two later, actually 10 o'clock, when Mr Charles H. Glassey stepped in. Mr Glassey, chairman of the company, is obviously as much trusted by the men as he is liked, and the letter he addressed to them which invited them to a meeting pointed out what they obviously realized as the truth, namely that in stoppages of this character, there are no winners. At the meeting, he supplemented his remarks, and the men also heard appeals supporting him from Mr Walter Swallow, the works director, and Mr George Kingdon, Midlands official of the General and Municipal Workers' Union. The result was that the men withdrew their ultimatum and, in a matter of hours, friendly negotiations began. There is every reason to believe that these will result in a settlement.

It is only right to add that Mr Glassey is perhaps in the nature of an exceptional employer. He has been with the company for 50 years or so. Even Mr Kingdon, the trade union official, reminded the men at the meeting that they had good employers, and it was probably this which induced Mr Glassey to reveal this interesting fact: 'During the early part of the year the company could have declared redundancy for 50 men. It did not do so. The company stood by you and will stand by you in the future—if you stand by the company.'

Mr Glassey, who is also chairman of other BIP Companies and of the Streetly Manufacturing Co. Ltd., is a vice-president of the Plastics Institute, and a past chairman of the Council and also President of the British Plastics Federation.

I was interested to see that rubber and plastics combine to produce several novel features in a new sailing dinghy tested last week. Designed by two Oxford undergraduates, manufactured by Bristol Aircraft Ltd. and assembled by Bossoms Boatyard of Oxford, the dinghy is built of two skins of glass fibre/polyester resin and is almost indestructible. Built-in buoyancy and self-sealing lockers make the boat unsinkable and it is also, as was shown in the tests, virtually impossible to capsize. An innovation is the rubber stem which reduces damage in the event of collision. The 12ft. dinghy sailed into second place in her maiden race on September 13.

Some of the members of the South Wales and Monmouthshire Section of the IRI on a recent 'Works Visit' to Siemens Edison Swan's cable factory at Lydbrook, Gloucestershire

Dr P. B. Lumb, who is to present a paper 'Faster Curing Butyl Rubbers' at the IRI London Section meeting on October 6, is a Yorkshireman now living in Canada. He was educated at Bradford G.S. and New College, Oxford. In 1953, after the degree of Doctor of Philosophy was conferred on him, for his syntheses of unsaturated long-chain acids, he emigrated to Canada to become a polymer chemist with Polymer Corporation. Since that time he has specialized in the chemistry of ionic polymerization systems, and particularly in the Butyl process.

DR P. B. LUMB

Prior to 1953, Dr Lumb was active in track and cross-country running, for both of which he won half-blues. Now however he prefers to spend his leisure time paddling a canoe on Northern lakes. His other hobbies include wine-making, water-colour sketching and gardening.

Dr Lumb, who is also an M.A. and a B.Sc., is married, and has a daughter and a son.

US Invitation

To readers of RJIP who are visiting the USA to attend the forthcoming International Rubber Conference (Washington D.C. November 9-13) a cordial invitation is extended by the Columbian Carbon Company to visit their new Research Centre at Princeton, New Jersey (RJIP September 19 page 224). Princeton is scarcely an hour's drive from New York and I learn from my Editor that arrangements for transportation will gladly be made by Columbian Carbon International Inc., 380, Madison Avenue, New York 17. (MUrray Hill 7-2300).

IRI News

SOUTH WALES AND MONMOUTHSHIRE — MERSEYSIDE

TWO events of importance in the South Wales and Monmouthshire Section have taken place since the beginning of the month; the 'Works Visit' to Siemens Edison Swan Ltd., on September 3, and the start of the 1959-60 season with Ladies' Evening on September 7.

The Ediswan Cable Works at Lydbrook, Glos., is situated in a very pleasant wooded valley on the bank of the River Wye, four and a half miles from Ross-on-Wye where the party lunched before the visit. The company incidentally own the fishing rights along a considerable stretch of the water and angling is a popular sport among the employees though salmon fishing is reserved for senior management and special guests.

The visitors were welcomed by Mr J. H. Barnett of Ediswan's who made all the arrangements, and, aided by his colleagues Mr Williams and Mr Smith, acted as guide for the tour of the works.

The process of most outstanding interest was the continuous vulcanization unit where the outer cover was being extruded and cured on twin-cored cable at a very substantial rate while a spark-testing monitoring device developed by members of the company's staff kept constant check on quality.

Conventional T-extruders, lapping machines, and the longitudinal process were all seen in operation putting rubber insulation on various sizes and types of cable and it was explained that while synthetics including silicone rubbers, butyl and neoprene find wide application, much top quality natural rubber is still called for, particularly in Government specifications. Pan-curing, in talc for the smaller sizes, after lapping with cloth for the larger diameters, or after applying a temporary lead sheath where a particularly smooth finish is specified is largely used, being versatile enough to cope with the large variety of types and sizes of cable produced, from the smallest flexible to the heaviest armoured and sheathed types.

The braiding section, where protective coverings in materials ranging from cotton to glass-fibre are woven onto the cables, was very interesting though too noisy for the sensitive ears of most members. Other non-rubber processes which were shown included the large section devoted to paper insulation where paper tape is lapped on and subsequently impregnated under vacuum with an insulating oil for high voltage applications.

It is traditional with the Section to start the lecture session with a Ladies' Evening, but this year showed a break with the past in that the main subject of the evening bore no discernible relation to the Rubber Industry, being a showing of part of a film devoted to the Bolshoi Ballet. At the Park Hotel, Cardiff, members, ladies and other guests to a total of some 60-odd were welcomed by the Section chairman, Mr W. Saul. Enjoyment of the film contributed largely to the pleasure of the evening.

G.D.G.

Merseyside

A lecture on 'Colour and Design in Fashion' was a subject intended to attract the ladies. And it did; they outnumbered the men by two to one. It was chosen to give a popular start to the new season and Mr W. Hall of the Calico Printers Association Ltd. did just what was required: talked engagingly and instructively, and interested the whole audience from beginning to end. Mr R. L. Dunn was in the chair and the meeting was held at the Adelphi Hotel, Liverpool, on September 14.

Mr Hall began by explaining the structure of the printed fabrics industry from weaver to wearer, and then concentrated on the reaction and counter-reaction on fashion of colour and design in printed fabrics. Changes in colour fashions were governed by two main factors; a continuous revolt of the customer from the prevailing colours, in an effort to be always fresh and new, and the availability of new colours from the dyestuffs' laboratories.

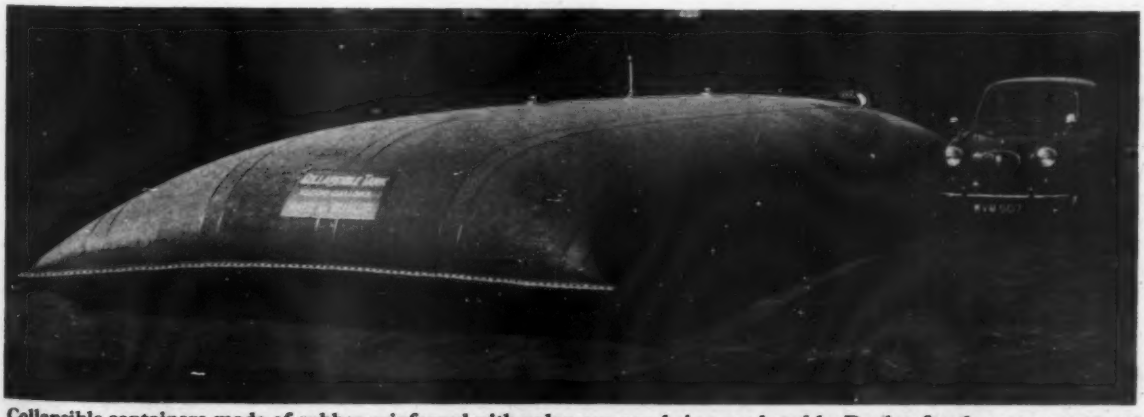
Not only availability of new colours but the introduction of new processes gave rise to new fashions or modified them. The lecturer demonstrated by means of his own paintings specially prepared that afternoon, what novel effects could be produced by smudging patches of wet paint with the thumb or a special instrument and showed some charming new fabrics printed by a recently developed photogravure technique. Mr Hall showed the actual painted designs of French artists which he had bought in Paris the previous week and explained how necessary it was to keep in touch with design ideas from all over the world.

In conclusion, the lecturer excited the ladies by giving his guess as to the likely forthcoming fashions in colour and design. The pattern units, he thought, would be either large or small, and colours would tend away from the present variety towards the monotone.

F.C.J.

Viton Prices Reduced

The price of Viton synthetic rubber is being reduced by $5 per lb. to $10 per lb., effective October 1, it was announced by Dupont's Elastomer Chemicals Department recently. The price cuts apply to Viton 'A' and Viton 'A-HV' grades.



Collapsible containers made of rubber reinforced with nylon are now being produced by Dunlop for the conveyance and storage of liquids in bulk. The fabric is coated on one side with neoprene and on the other with a variety of natural, sweetened or synthetic rubbers according to the liquid to be carried. The containers, which can be rolled up when empty and carried, for instance, on the cab roof of a truck, leaving space for a different load on a return journey, are available in standard capacities of 250, 500, 800 and 1,000 gal. They are also made in a variety of dimensions to fit both vehicle bodies and aircraft fuselages. Illustrated is a 10,000-gal. container for static storage

Silvertown Awards

MR DAVID HEDLEY and Mr Baron Guest, both of whom have completed 50 years' service with the Silvertown Rubber Co. Ltd., London, E.16, a subsidiary of BTR Industries Ltd., were presented with gifts of £50 tax free and a 50-year badge and certificate, at a recent long-service award presentation ceremony held in the company's works canteen. Twenty-nine other long service employees from Silvertown and from BTR at Walthamstow, also received awards; the presentations were made by Sir Eric Miéville, chairman of the Silvertown Rubber Co. Ltd.

Other awards were as follows: For 40 years' service (a 40-year badge), John Ferris, Miss Margaret Girdwood, E. D. Nicholls, J. W. Springford, W. H. Young, C. W. Bishop (Walthamstow) and J. C. E. Felstead (Walthamstow); for 30 years' service (a gold watch and 30-year badge), C. F. Bence, S. W. Evett, Miss J. Main, C. Nelson, C. W. Robbins, R. L. Walker, D. J. Zedgett, R. Grimes (Walthamstow), and C. W. Morgan (Walthamstow); for 25 years (a certificate), F. C. Bradshaw, W. J. King, Mrs E. B. Sadler, T. C. Unwin, Miss A. M. Tomlin (Walthamstow); 20 years (a 20-year badge), C. L. Coleman, A. R. Dormer, A. Pointer, E. Pointer, A. W. F. Spicknell, Miss M. W. M. Woiwod, Mrs A. M. Wright, W. C. Barker (Walthamstow).

Sir Eric Miéville, *centre*, with Mr David Hedley and Mr Baron Guest

IDENTIFICATION OF RUBBER CHEMICALS

Colorimetric identification of rubber chemicals was discussed by Clifford L. Hilton, US Rubber Company research scientist, in a paper presented before the analytical division of the American Chemical Society at the society's 136th meeting on September 14.

Mr Hilton told the group how protective substances such as antioxidants in rubber are identified as to type and amount by the depth of characteristic colours they develop when treated with special chemicals. He explained that diazotized p-nitroaniline is used as a coupling agent for phenolic antioxidants. The intensity of the colour formed indicates its concentration and the colour itself identifies the antioxidant.

Metal Industries Ltd. announces that Mr W. Padley, C.M.G., O.B.E., who has been personal assistant to the chairman, Sir Charles Westlake, has been appointed administrative controller. Mr P. Jardine, the group chief accountant, becomes group financial controller.

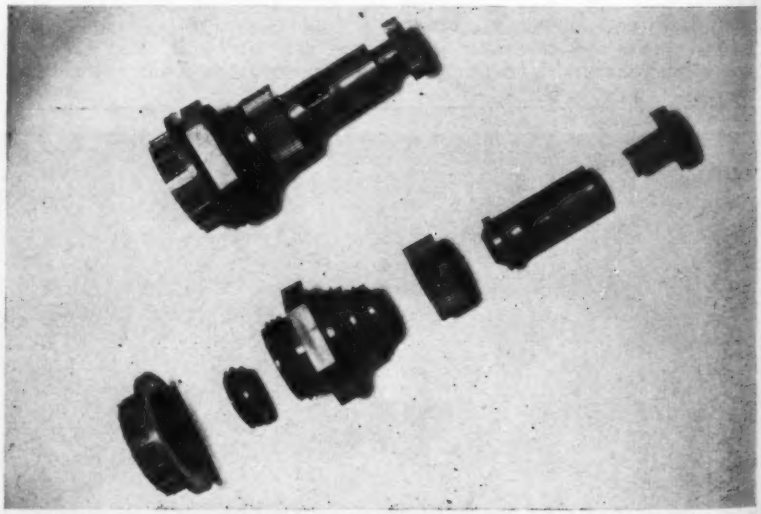
RUBBERIZED ROADS IN AUSTRALIA

From Australia comes further evidence of growing appreciation by highway authorities of the advantages of rubberized bitumen for road surfacings where terrain and climate are difficult. 'Rubber in Roads, Bulletin No. 13,' published by The Natural Rubber Development Board, describes recent series of layings of rubberized bitumen in various towns in Queensland.

The bulletin states: 'Each of these centres had its own particular problem, but in general what was required was a flexible tenacious binder which would maintain a seal over surfaces subjected to some degree of movement and where cracking was already apparent.' The decision to try out rubberized bitumen in Queensland was influenced by the good reports of the performance of rubberized surfacings laid previously in Tasmania, Victoria, South Australia and Western Australia.

First reports from the Queensland layings were 'extremely favourable.' One of the engineers responsible stated that he was 'most impressed with the unusual quality of the rubberized bitumen, notably its elasticity and its strong powers of adhesion.' Two of the four authorities concerned have already ordered more rubber powder.

The bulletin is available, free of charge, from The Natural Rubber Development Board, Market Buildings, Mark Lane, London, E.C.3.



A drip-proof and reversible drum tap which can be used with virtually any liquids, including paraffin, trichlorethylene, turpentine and others difficult to handle, is now being marketed by Phillips Telescopic Taps Ltd. (Colliery Road, Birmingham Road, West Bromwich, Staffs. Tel.: West Bromwich 2354). The new tap, consisting of six components moulded in British Resin Products' Rigidex high-density polythene, is extremely tough and proof against drip and seepage even with paraffin

BELT-CONVEYING COSTS CUT BY HALF AT I.C.I. PLANT

Butyl Rubber covered belt has already lasted 3 times as long as any other—and still no sign of wear

By installing Butyl Rubber covered conveyor belting at their Billingham Chemicals Plant, I.C.I. have cut the cost of belt-conveying phosphate fertilizer by half, and the belting still shows no sign of wear.

WORKING LIFE TREBLED

Owing to the heat of the fertilizer at this stage in the process (*about 115 degrees centigrade*), and the usual damage due to moisture and ageing, even the best synthetic rubber belts used previously have worn out in a year, after shifting about 132,000 tons. A second Butyl Rubber belt was installed elsewhere in the plant three years ago and has shifted 500,000 tons.

COST STILL GOING DOWN

The Butyl Rubber belting is still in perfect condition. And, although it is impossible to forecast its future life, it is expected to reduce the cost of belt-conveying still further.

When ordering conveyor belting it will pay you to specify

Esso Butyl

The man-made rubber with the longest flex life and the greatest resistance to heat, corrosion, ageing, ozone, moisture and tearing. (For handling specially hot materials, Esso Butyl covered belting is even more efficient on a Terylene base.)

Esso Butyl is identical to 'Enjay' Butyl which has established a high reputation in the United States

For information about Esso Butyl Rubber

Telephone: HYD 7030, or write to Esso Petroleum Co, Ltd, Chemicals Dept, 50 Stratton St, Piccadilly, London, W1

Plastics Materials and Processing

PARIS CONVENTION—4

'GLASS FIBRE Reinforced Polyester Plastics' were dealt with by M. Mario Lenzini, Société Montecatini (Milan) at the recent 5th International Chemical Exhibition Convention in Paris. The material had first been shown by Mr Sassieli in 1955 when doubts were expressed as to its possibilities. A large number of experiments had been carried out at Montecatini using hot pressed samples with two different loadings of calcium carbonate and the test pieces had been exposed to various influences. Degradation of tensile strength on ageing was greater in the presence of calcium carbonate than without but the total strength was higher. Similar considerations applied to the influence not only of the atmosphere but of pure water and sea water. Tensile strength never fell below 1,500 kilogrammes per square centimetre (21,000 psi) even on ageing in air.

Hot moulding was, however, an expensive process and as an alternative to the normal method of making, the use of polyester moulds had been developed for a cold moulding process. This used benzoyl peroxide with diethylaniline to set the material, the setting taking place in 10 to 14 minutes.

Up to 2,000 mouldings could be made from a polyester mould, including lifeboats, several slides of which were displayed.

In the discussion it was pointed out that the lecturer had shown figures for hot moulded material and then described a cold moulding process. What were the properties of the mouldings obtained by his process? This was important because the deficiencies of the normal hand-produced cold moulded articles had been the subject of a Users' Conference organized by the Plastics Institute of England at Brighton about a year ago.

In reply, the lecturer admitted that the properties of the cold moulded materials might be different. He had no figures at present but hoped to have them within about a year.

CONVERSAZIONE 'ON'

The Plastics Institute President's Reception and Conversazione is, after all, to be held on October 9. The Plastics Institute earlier advised that in the event of Parliament being prorogued before that date, the event would be postponed. Now, we are informed that the conversazione is 'on' and will be held as previously announced in the Members' and Strangers' Dining Rooms at the House of Commons.

Mr R. W. Reed, Universal Asbestos Manufacturing Co. Ltd., group area sales manager in Birmingham, retired on May 30. As already announced, he is succeeded by Mr H. J. Blower.

Fawcett Preston, Metal Industries Group's engineering subsidiary, of Bromborough, Cheshire, has secured orders valued at almost £30,000 for cable-making machinery for Finland and Denmark.

SB COPOLYMER LATICES

Monsanto Chemicals Ltd. announces that it is now manufacturing at its Newport, Monmouthshire, factory three styrene/butadiene copolymer latices. These latices are suitable for use in coatings for leather and paper, for non-iron fabrics, for the backings of tufted carpets and rugs, and also have applications in the manufacture of adhesives and emulsion paints.

Latex SB1 contains approximately 60% styrene. Latex SB2 is similar but contains an added stabilizer which improves its resistance to breakdown when subjected to strong shearing forces.

They are compatible with other polymer latices, such as SBR and polystyrene, and can be used, for example, with Latex SB3, a material of higher styrene content (85%) for the production of harder and more rigid films. Latex SB3 may also be used as a stiffener for latex foam products.

Formulation with filler or pigment slurries is straightforward providing nonionic or anionic wetting agents are employed to suspend the solids.

Review

PROCESSING OF THERMOPLASTIC MATERIALS. Edited by Ernest C. Bernhardt. (Plastics Engineering Series, Reinhold, New York, Chapman and Hall, London. Price 146s.).

The rapid growth in production of thermoplastics has been paralleled by a steady growth in techniques and plant available for their processing. In the early days the rubber industry provided much of the equipment, such as calenders and extruders, which, with improvisation and modification, was used for the shaping of thermoplastics. An indication of the progress which has been made is afforded by the present volume.

Basic concepts are described in the first section of the book and practical applications in the second. A final section gives data on the processing properties of many thermoplastic materials. The first section consists of chapters on flow properties, heat transfer and thermodynamics, mixing and dispersing. As these may be considered as branches of applied physics the treatment, as would be expected, is mainly mathematical.

Practical plant applications in the second section include chapters on extrusion, injection moulding, calendering, mixing and dispersing processes, sheet forming, forming of hollow articles, and sealing and welding of thermoplastics. The treatment of the various processes is somewhat uneven. In the first four chapters the emphasis is on fundamentals which will be of interest to the designer of specialist machines, but the plant engineer will find little to help him either in choosing a machine for a particular purpose or in obtaining the maximum efficiency from his existing plant. The remaining chapters, covering items which have, as yet, little developed theoretical background, contain much information which will be useful for those engaged in actual processing.

A final section on thermoplastic material properties, which occupies some 130 pages, doubtless contains much useful information. Unfortunately the materials specified are almost exclusively of US origin, which limits the value of the section to readers in this country.

General readers, who wish to know more about the fundamentals which govern the behaviour of the materials they are handling, will find the book useful even if they are not able to follow all the mathematical treatments in detail. For those engaged in the design and manufacture of machines for thermoplastic processing it is a valuable source of information much of which was previously only available in articles scattered throughout the literature.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

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Rubber Statistics

WORLD POSITION AT END OF JUNE — UNITED KINGDOM

DETAILS of the world rubber position up to the end of June last are contained in the latest issue of the Rubber Statistical Bulletin which is issued by the Secretariat of the International Rubber Study Group. In the table which follows, natural rubber production during the first half of the year is compared with production during the first half of 1958 (in 1,000 long tons).

NATURAL PRODUCTION

	Jan.-June 1959		Jan.-June 1958	
Malaya:				
Estates ..	190½		178	
Smallholdings	135½		127	
	——	326	—P	305
Indonesia:				
Estates ..	105		116½	
Smallholdings	239		117½	
	——	344	——	234
Ceylon		36		47½
Thailand ..		82½		72
Sarawak ..		18		17
Other British Borneo ..		10½		9
Liberia		20		18
India		9		10
Belgian Congo..		18½		15
Others		118		172½
		——		——
		982½		900

In the case of Malaya, production on both estates and smallholdings has increased by some 6% compared with last year.

The following table shows the natural rubber consumption position during the half-year:—

NATURAL CONSUMPTION

	Jan.-June 1959	Jan.-June 1958
UK	90½	92
USA	277	227
France	69	72
Western Germany ..	69	61
Remainder of Europe	248	246
Others	296½	259½
	1,050	957½

The considerable increase in US consumption, which is apparent from the above table, amounts to about 22%, compared with an increase of some 26% in the case of synthetic rubber. The slight fall in UK consumption, which is matched by increasing synthetic usage, reflects the present trend in favour of home-produced synthetic in this country.

Synthetic Rubber

Synthetic rubber consumption is illustrated in the following table:

SYNTHETIC CONSUMPTION

	Jan.-June 1959	Jan.-June 1958
UK	38½	33
USA	518	409
France	30	30
Western Germany ..	31	26
Remainder of Europe	34	31
Others	81	63½
	732½	592½

The overall increase in synthetic rubber consumption during the first half of this year amounts to some 23%, that in natural rubber consumption to around 10%.

Latest UK Position

Imports of natural rubber into the UK during the half-year ended June 30 amounted to 99,111 tons, and re-exports totalled 15,858 tons, leaving a new supply of 83,253 tons available for consumption. The actual consumption total for this period was 90,376 tons compared with a consumption total of 92,409 tons during the first half of last year.

The June consumption total for natural rubber was 18,328 tons which, over a five-week period, averaged out at 3,665 tons a week, as against an average for May of 3,453 tons. Stocks on hand at the end of June stood at 21,664 tons of crude and 5,173 tons of latex; stocks of crude had fallen from the year-end figure of 25,110 tons, when, however, stocks of latex had been some 400 tons lower at 4,776 tons.

The new supply of synthetic rubber during this period amounted to 38,350 tons, and consumption totalled 38,573 tons, 30,121 tons of this latter amount consisting of S-Type synthetic; in 1958, the synthetic consumption total had been 33,107 tons. Stocks on hand at the end of June totalled 9,205 tons, having fallen to this figure from the year-end level of 12,430 tons.

Export Opportunities

Polythene Pipe for USA

Paul, Rice and Levy Inc., 501 Poydras Street, New Orleans 12, Louisiana, have informed the British Consulate-General at New Orleans that they would like to receive quotations from UK manufacturers of polythene pipe in standard lengths, of sizes ¼in. to 3in., various wall thicknesses in rigid and semi-rigid quality.

Suppliers interested in this enquiry should write by air mail direct to Paul, Rice and Levy Inc., addressing their correspondence for the attention of Mr F. G. McFarlane, Jun., Vice-President. It would be appreciated if responding firms would copy their initial correspondence, with enclosures, to the British Consulate-General, 403 International Trade Mart, New Orleans 12, to enable the enquiry to be pursued and to assist in approaching other potential importers. B.o.T. reference: ESB/20910/59.

The address of the Export Services Branch of the Board of Trade is Lacon House, Theobalds Road, London, W.C.1. Telephone number: Chancery 4411, extensions 776 or 866.

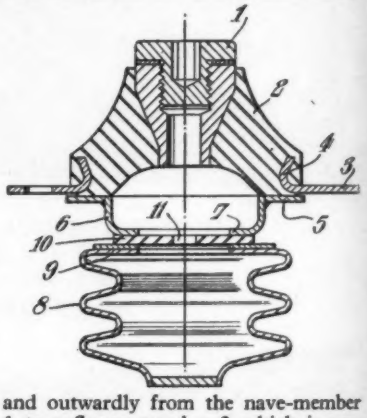
Patent Specifications

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Vibration Dampers

No. 811,748. Metalastik Ltd. Inventor: A. J. Reed. Application, July 31 1956. Filed, May 28 1957. Published, April 8 1959.

A vibration damper is of the kind in which steady vibrations of low amplitude are taken up by a rubber mass while shock loads, acting through the rubber mass, bring into effect a hydraulic damper so that movement of the rubber mass is rapidly and effectively restricted. As shown in the drawing, the load is applied to a nave-member 1 which is embedded in and integrally united with an annular rubber mass 2. The rubber mass extends downwardly



and outwardly from the nave-member 1 to a flange member 3 which is embedded at 4 in the rubber mass. The flange member 3 is secured to a base member from which the load is to be supported. An annular metal disc 5 is bonded to the lower surface of the rubber mass 2 and a dished member 6, flanged as at 7, depends from the disc 5. Secured to the flange 7 is a closed cup 8 which is inwardly flanged at 9, and between the flanges 7 and 9 there is a circular diaphragm of flexible rubber 10 having a central hole 11. The parts 6 and 8 constitute two parts of a chamber filled with hydraulic fluid, the two parts communicating through the hole 11.

When the device is subjected to vibrations of low amplitude, these will be absorbed by the rubber mass 2, but since the rubber mass forms part of the wall of the chamber 6, the vibrations will be transmitted to the hydraulic fluid in the chamber. This will result in deformation of the diaphragm 10, but in effect no fluid will pass through the hole 11 as the vibrations are of low amplitude. When, however, a shock load is applied to the rubber mass 2, hydraulic fluid will be forced through the hole 11 into the lower part 8 of the chamber with the result that the shock-loading will be subjected to a relatively large damping force.

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Technical Data

Rigid Polyurethane Foam for Corrosion Protection

A preliminary investigation to determine whether sprayed Daltolac 41/Suprasec D based rigid foam was useful as an anti-corrosion barrier is reported in Technical Information—Urethane PC/U 10 issued by the Polymer and Chemicals Service Department, Dyestuffs Division, Imperial Chemical Industries Ltd.

Burnished and rusty mild steel panels, both primed with red lead and unprimed, were spray-coated with Daltolac 41/Suprasec D based rigid foam and were subjected to three test conditions, namely (a) exterior exposure in the industrial area of Manchester, (b) salt spray test and (c) humidity test, (b) and (c) being carried out according to Specification DEF 1053. The results, which are given in detail, indicate that the relative order of merit of the four sprayed foam systems was as follows: (1) Foam on primed, burnished steel, (2) foam on primed rusty steel, (c) foam on unprimed, burnished steel, (c) foam on unprimed, rusty steel. The tests show that sprayed Daltolac 41/Suprasec D based rigid foam gives good protection against corrosion to mild steel panels under the conditions of test employed. It is possible to apply a layer of foam ¼-½in. thick in a single pass of a spray gun and a layer of this thickness will normally fill in or seal off those cracks and junctions between metal members of a structure that cannot easily be reached by paint whether applied by brush or spray. Such awkwardly shaped cavities are often located at highly stressed points, *e.g.* bolt and rivet holes or lines of spot welds, where protection against corrosion is particularly important.

Pepton 65

Pepton 65 is a very active peptizer for natural rubber at the low temperatures generally encountered in open mill mastication and at the beginning of plasticizing cycles in an internal mixer. It is effective also in SBR. Chemically, Pepton 65 is zinc 2-benzamidophenate, and it has a much lower threshold temperature than that of the well-known peptizer Pepton 22. Data for the properties of Pepton 65 and for its behaviour in natural rubber and in SBR are given in Report No. 145/R/59 issued by the Anchor Chemical Co. Ltd., Manchester 11.

In the tests with natural rubber, 250gm. of smoked sheet were masticated in a laboratory Banbury for 6min. with three different amounts of Pepton 65 at 10°C. intervals over the temperature range 70°C. to 140°C. Figures for the Mooney viscosity of the samples are given, similar data using Pepton 22 being included for comparison. The results show that Pepton 65 is active over the whole of this temperature range and is much more active than Pepton 22 at the lower temperatures. In the tests with SBR, the rubber used were SBR 1006, SBR 1500 and SBR 1712, a marked reduction in Mooney viscosity being achieved by the use of Pepton 65. For maximum effect in natural rubber or SBR, Pepton 65 should be introduced early in the mastication cycle before other ingredients have been added. Addition in the form of a 20% masterbatch is very effective. The use of 0.05–0.5% is recommended for natural rubber, average dosages being 0.1–0.2%. Pepton 65 disperses readily and it is believed to be non-toxic under normal conditions of use although the precautions usual with any organic powder should be exercised.

PVC and Nitrile Rubber

Basic technical data on the range of Geon PVC resins, latices and compounds as well as Hycar nitrile rubbers and latices are given in handy form in Data Book No. 1 issued by British Geon Ltd., Devonshire House, Piccadilly, London, W.1. The data are tabulated and a useful feature of the booklet is a list of the products for which the various materials can be used.

The PVC resins comprise straight PVC materials and copolymers of vinyl chloride with (a) vinylidene chloride and (b) vinyl acetate, the data including figures for specific gravity, viscosity and particle size. The Geon latices comprise a straight PVC latex, an unplasticized and a plasticized modified PVC latex and a special vinyl latex which forms flexible films on air drying without addition of plasticizer. Data for these latices include pH value, total solids, specific gravity, viscosity and particle size. The Geon compounds comprise both flexible and rigid grades covering the complete BS softness range and they may be grouped into three classes, namely (a) flexible extrusion compounds, (b) rigid compounds and (c) injection moulding compounds. Extensive data for the mechanical and electrical properties of the compounds are given. The booklet concludes with particulars of the four grades of solid Hycar nitrile rubbers and the four Hycar nitrile latices. Data for the solid rubbers include specific gravity, Mooney viscosity and ash content, and for the latices, pH value, total solids, particle size, specific gravity, viscosity and surface tension.

Members of the Goodyear Tyre and Rubber Co. (Great Britain) Ltd. gathered at their headquarters in Wolverhampton to pay tribute to their retiring sales personnel manager, H. B. (Horace) Levin. At the ceremony Mr Levin received a cheque from his many friends and colleagues, and his 40-year service pin, both presentations being made by the firm's managing director, M. S. Meyer

Machines, Materials and Equipment

Sheet Thickness Calibrator

A unit for grouping sheet material according to thickness (up to ½in.), designed specially for tinplate and light sheet metal, can also be used for sorting sheets of steel, brass, aluminium, plastics, cardboard, paper, leather, etc. Sheets to be sorted are pulled manually through hardened rollers, and the thickness is registered on a dial. The standard model is fitted with a plain dial and two adjustable guages for sorting sheets into three categories, light, medium and heavy. Models with calibrated dials, and suitable for handling sheets thicker than ½in., can be supplied if required. The machine, which can handle up to 1,500 sheets per hour, is manufactured by F. J. Edwards Ltd., 359-61 Euston Road, London, N.W.1.

Publications Received

Diamond Chemicals

The Diamond Alkali Co., International Division, announces the publication of 'Diamond Chemicals for Industry.' This catalouge comprises 75 pages and covers 200 chemicals produced at Diamond's 15 plants. Convenient cross references and indices are used to enable the chemical buyer to determine various applications in 30 industries. Each product is completely described with analyses and data showing suggested methods of usage. The book is available on request to: Diamond Alkali Co., International Division, Department IND, 99 Park Avenue, New York 16.

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Plantation Share Survey

SINCE our last review of Plantation interests appeared much has happened in the Stock Market and the actual commodity market. In the first instance there was a further sharp rise in the price of raw rubber. This was brought about by the technical position relating to available world stocks and the heavy spate of buying from the Iron Curtain countries. The rise was additionally aided by mounting belief that the 'strategic' stockpiles of the commodity held by the Western nations would, for the time being, remain unchanged.

This 'boomlet' in its turn brought about sharp gains in all leading rubber producing concerns. Yields which for months had been standing at well over 15% and more were in a very short time brought down to around 10%. The market was apparently 'set fair'—and not a single cloud to mar the horizon.

Then suddenly the position changed. The Americans announced that they were disposing of 470,000 tons of their stockpile and almost simultaneously the Board of Trade said it would sell off 100,000 tons.

In the case of the USA disposal will take nine years, the UK however will unload its surplus as soon as possible without affecting the market. The mere announcement upset the market. Raw rubber was reduced from more than 33d per lb. to just over 31d per lb. and Rubber shares were put into reverse. The significance of the disposal plan is more fully appreciated when it is realised that the 570,000 tons of rubber now overhanging the market has nearly doubled the known stocks of the world.

For the present there is little to fear. It is obvious that Rubber companies are about to announce what will in many cases be record results. There is still the almost certain prospect of bumper dividends. The yield of 10% obtainable on the market leaders may yet turn out to be an underestimate of the short term potential.

Underlying this prospect, however, is a feeling of growing uncertainty and this is in evidence in the 'future' prices now being quoted for the commodity. The current price for April-June 1960 delivery is now around 27¾d per lb. or 2¼d per lb. below the 'spot' rate.

This apparent reaction is welcomed by most of the more responsible producers. A high price for raw rubber could not possibly be sustained for a long duration. It would reduce its competitive power as opposed to synthetic and in time would reduce demand. The growers are now working to an exceptionally attractive profit margin and it would not be surprising if some elements within the industry would like to see these margins further reduced.

In the past few days the tone in the rubber section of the stock markets has quietened considerably. The buying has slowed and there has been a tendency for prices to slip back a little. How much of this is due to the uncertainty of the rubber situation and how much to the General Election uncertainties is difficult to ascertain at present.

Prices of the leading rubber shares are now well below their peak levels. UNITED SUA BETONG which still holds the mantle of 'leader' has come back from a peak of 82s. to 72s. 6d. HIGHLANDS AND LOWLANDS which is expected to become the world's largest single rubber producing company in the current year, has dipped from 6s. 7½d. to 5s. 9d.

The improved results from GOLDEN HOPE have helped to steady the price at around 4s. 4½d. which is only pennies off the year's peak. At this price the yield on the shares is in the region of 10% and the earnings 'cover' for the 22½% is in the region of 2½ times.

One of the more important developments has been the proposed offers from KUALA LUMPUR RUBBER for the capital of the JERAM RUBBER and TAMIANG RUBBER groups. These offers have now been declared 'unconditional' by the Kuala board but lists for acceptances will remain open for the time being.

BUKIT SEMBAWANG RUBBER and SINGAPORE UNITED RUBBER are planning to merge. The terms of exchange are one Bukit 1s. share for each 1s. unit in Singapore. This merger has met with widespread approval and there is apparently no reason why it should not go through.

Under a re-organization scheme the GRAND CENTRAL (CEYLON) RUBBER concern will become the property of a new company, GRAND CENTRAL INVESTMENT HOLDINGS. This new company will take-over all the stock and investments now owned by the 'Rubber' company.

BERADIN RUBBER is paying an interim of 10% on the increased capital. Last year the total payment was 40%. SEMPAH (HOLDINGS) which was formerly a rubber company but which now carries on business as an investment holding group is raising its dividend for the year from 25% to 30% and is also lifting its interim for the current year from 10% to 12½%. There will be a scrip issue of two 1s. Deferred shares for each 2s. share held.

CICELY RUBBER is raising its dividend from the equivalent of 15% to 25%. The profits have nearly doubled at £28,000 and the net balance comes out at £18,000 compared with £7,300. Despite the fact that it is one of the smaller companies Cicely has a very high investment rating. At 3s. the Ordinary shares return less than 8½%.

The dividend from KEPONG RUBBER was up to market expectations. Following the news of a 20% payment on the increased capital the shares were quoted at around 3s. to return 13½%.

SEAFIELD RUBBER has now received exceptionally high acceptances from its offers for control of nine separate rubber companies. In all instances the acceptances have not fallen below 84% of the capital involved.

KAMUNING RUBBER AND TIN is paying 33⅓% tax free on the capital as doubled by a scrip issue. This compares with 50% a year ago.

UK Office at Regina

A new Trade Commission office to cover the Province of Saskatchewan has been opened at Regina. Mr P. C. Burdett has been detached from Winnipeg to take charge of the new office, the address of which is: Room 207, Derrick Building, 2431 Eleventh Avenue, Regina, Saskatchewan. Telephone Lakeside 7-6459. Telegraphic address is 'Regcom, Regina.'

An RAF Canberra bomber is here seen firing its rockets from rocket launchers manufactured in glass fibre by Microcell Ltd., Ingersoll House, 9 Kingsway, London, W.C.2. The company has also developed rocket launchers in this material for the Sea Vixen, the Scimitar, Lightning and Hunter. Previous mention of the installation for the Sea Vixen was made in *RJIP*, June 21 1958

Rubber Markets

LONDON

The effects of the news that both the US and UK stockpiles are to sell rubber proved to be short lived in the rubber market. Following last week's sharp fall on the news, prices of forward positions record little further change while the Spot and nearby positions show substantial rises. This reflects the continuing shortage of nearby supplies. The Spot is 1½d. higher at 33½d. per lb. nominal while nearby positions are well over a penny per lb. higher. The more distant positions, however, are not much changed.

Latest prices are as follows:

No. 1 RSS Spot: 33½d. nominal.

Settlement House:
October 33½d. nominal.
October/December 32½d. nominal.
January/March 28½d.- 28⅝d.
April/June 28-28⅛d.
July/September 27⅞d.-27⅞d.
October/December 27⅞d.-27⅞d.

No. 1 RSS cif basis ports:
October 29½d.-29⅝d.
November 29⅛d.-29⅜d.

Godown:
October 100½ Straits cents nominal.

Latex

Centrifuged latex per gallon in drums, November shipments, 18s. 3d. seller, cif European ports. Spot, 19s. 3d. nominal. Bulk, 17s. 10d. December delivery, nominal. Creamed, seller, 17s. 10d. November. Normal, seller, 14s. 1d. September/October.

AMSTERDAM

The Amsterdam rubber market ruled as follows on September 21:

No. 1 RMA	Guilders per kilo Sept. 21	Previous
September	2.97	2.97
October	2.96	2.96
November	2.95	2.95
December	2.94	2.94
October/December ..	2.95	2.95
January	2.77½	2.77½

Sales: 30 Tendency: Quiet

CEYLON

No. 1 RSS

The price of No. 1 RSS spot at Colombo on September 14 was 121¼ (120¼) Ceylon cents per lb.

SINGAPORE

The market was marked up at the outset on September 21 and thereafter ruled very quiet with minor fluctuations. Lower sheet interest was fair but again the accent was on near positions. Factories were quiet. There was little inclination to trade during most of the afternoon, but towards the close, activity broadened somewhat. Lower sheets were neglected. After hours, the market was quietly steady.

	Straits cents per lb., fob Malayan ports to open ports Close	Prev. Close
No. 1 RSS, Oct.	101⅜–101⅞	101⅛–101⅜
Nov.	100 –100½	99½– 99¾
No. 2 RSS, Oct.	100⅜–101⅛	100⅛–100⅜
No. 3 RSS, Oct.	100¼–100⅜	99½–100
No. 4 RSS, Oct.	99 – 99½	98½– 98⅜
No. 5 RSS, Oct.	97⅜– 98⅛	96½– 97⅛
No. 1 RSS, Spot	103⅛–104⅛	103⅜–104⅛
No. 3 blanket, thick remilled, Oct.	97½– 99½	98 –100
No. 1 fine pale crepe, Oct. ..	112½–114½	112 –114
Thin brown crepe, Oct.	97½– 98½	97⅜– 98⅜

Tendency: Quietly steady

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rec. drums fob at 200.20d. per gallon.

NEW YORK

The New York rubber market ruled as follows on September 21:

Dealers' Prices

	Ex-dock US cents per lb. Sept. 21	Previous
No. 1 RSS, Oct. ..	37½b–37⅛a	37n
Nov...	36b–36⅛a	35⅞b
No. 2 RSS, Oct. ..	37b–37⅛a	36⅞n
Nov...	35⅞b–36a	35½n
No. 3 RSS, Oct. ..	36⅞b–37a	36½n
Nov...	35½b–35⅞a	35½n
No. 1 RSS, Spot..	39½n	39n
No. 3 amber blanket crepe, Dec...	35½b–35⅝a	35n
No. 1 latex, thin crepe, Oct. ..	38n	37⅞n
No. 1 latex, thick crepe, Oct. ..	39n	38½n

Futures—Rex Contract

	Close US cents per lb.	Prev. Close
Sept. ..	39.00b–39.25a	36.40b–39.00a
Nov. ..	36.10b–36.20a	35.70b–35.75a
Jan. ..	34.60t	34.40–34.45t
March ..	33.75b–33.90a	33.65b–33.70a
May ..	33.40b–33.60a	33.20b–33.40a
July ..	33.00b–33.20a	32.80b–33.00a
Sept. ..	32.70b–32.90a	32.50b–32.75a

Sales: 41 Tendency: Steady

Futures were firmer on some covering on September 21 and trade buying in a moderate volume reflecting the better tone in London and the underlying good demand from factories. Traders said that factories were showing interest in November/December arrivals. Shipment offerings were quite steady but on the light side.

DJAKARTA

Fair business was done on September 21 during the morning hours for sheet No. 1 for ready delivery at 28.5 rupiahs. There was a very good demand for sheet No. 1 for ready delivery but sellers were rather reserved. The market closed steady.

	Rupiahs per kilo Sept. 21	Previous
Spot No. 1 Priok ..	28.40b	28.20t
Spot No. 2 Priok ..	27.40b	27.10n
Spot No. 3 Priok ..	26.40b	26.00n
No. 1 fine pale crepe, spot	27.00b	Unquoted

Tendency: Steady

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on September 14 was 32.50 (32.50) US cents per lb.

Paper Coating Resins

Three new polythene paper coating resins have been developed by US Industrial Chemicals Co. They are designated Petrothene 200-2, 201-2, and 203-2, and are now commercially available. It is understood that considerable success has been met in extruding these resins on to a variety of substrates including paper, paperboard, foil, Cellophane, and others. Some basic properties and recommended applications are as follows:

	Melt Index	Density	Recommended Coating Weights lb. per 3,000 sq. ft.
200–2	3.0	0.915	20
201–2	5.0	0.915	10 to 25
203–2	8.0	0.915	3 to 15

Technical data sheets are available.

Canadian Asbestos

Shipments of asbestos from mines in Canada rose substantially in May this year compared to year ago and brought total for first five months ahead of year ago. Shipments in May amounted to 91,257 tons, compared to 70,883 a year ago and in the January-May period to 374,085 tons from 320,937 tons.

Mines in Quebec Province shipped 85,738 tons in May against 66,916 year earlier and 351,432 tons in the five months compared to 300,897 tons year ago. Asbestos exports in May rose to 94,612 tons, compared to 78,785 year ago, making the January-May total larger than year ago at 363,925 tons against 296,069.

Adhesive for Acoustic Tiles

A new adhesive for bonding acoustic tiles and insulating board to plaster, wood or cement rendered surfaces has been developed by the Dunlop Rubber Co., Compositions Division. The adhesive (S.849) is a solvent based viscous black cement which is applied to the tile, holding it suspended with an air space between it and the ceiling, thus adding to its acoustic properties.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on July 22, 1959

British Insulated Callender's Cables Ltd. Method of attaching fittings to rods or tubes of resin-bonded fibre, and fittings attached to such rods or tubes. 816,926.

McNeil Machine and Engineering Co. Apparatus to remove cured tyres from a press for shaping and curing tyres. 816,833.

Beck, Koller and Co. (England) Ltd. Production of polyamide-like condensation products and synthetic resin compositions containing same. 816,986.

Imperial Chemical Industries. Production of thermoplastic polymeric materials. 817,141.

Union Carbide Corporation. Production of polychlorotrifluoroethylene filaments. 816,987.

Monsanto Chemicals Ltd. Preparation of polysiloxanes. 817,105.

Akron Standard Mold Co. Apparatus for feeding tyre building material to a tyre building apparatus. 816,881.

Imperial Chemical Industries Ltd. Vinyl chloride polymer compositions. 817,041.

Dow Chemical Co. Method for preparing acrylonitrile containing fibres. 816,841.

Houilleres du Bassin du Nord et du Pas de Calais. Process for producing polyethylenes having substantially uniform physico-chemical properties. 817,145.

Future Events

PLASTICS INSTITUTE

London and District Section. — Tuesday October 6 at the Wellcome Building, 183-193 Euston Road, London, N.W.1. at 6.30 p.m. 'Design in Plastics' by M. O. Rowlands, M.S.I.A., Ekco Plastics Ltd.

Plastics and Polymer Group, Society of Chemical Industry. — Monday October 5 at the SCI Meeting Room, 14 Belgrave Square, London, S.W.1. 'The Polymerization of Olefines Using Organo-metallic Catalysts,' by Sir Robert Robinson. Joint meeting with the London Section, Society of Chemical Industry.

EXHIBITION

The International Scientific Research Exhibition will be held at Olympia, London, from October 3-10.

NEW COMPANIES

GCK Plastics Ltd. (628,176).—May 14. Capital: £1,000 in £1 shares. To acquire and take over the business of Greenfield, Cox and Kemp, carried on at Camberley; to carry on the business of manufacturers of and dealers in plastic materials and articles, etc. The directors are: Stanley M. Greenfield, West House Wing, West Road, Camberley, toy manufacturer; Mrs Ethel D. Cox, Sandilands, Frimley, Aldershot; Lionel A. Kemp, Abbeywood Cottage, Upper Gordon Road, Camberley. Regd. office: 91a High Street, Camberley, Surrey.

Percy Whyte (Liverpool) Ltd. (628,713)—May 25. Capital: £10,000 in £1 shares. To carry on the business of buyers and sellers of, and wholesale and retail dealers in, merchandise of all kinds, particularly rubber goods, including clothing, asbestos goods of all kinds, including steam and water packings, etc. The directors are: Percy E. Whyte, Mrs. Amy F. Whyte, both of Corner House, Earle Drive, Neston, Cheshire; Linda M. Seymour-Hart, and Arthur Thurston. Regd. office: 46 Fenwick Street, Liverpool, 2.

Poliastic Ltd. (631,179).—June 25. Capital: £1,000 in £1 shares. To carry on the business of manufacturers of and dealers in all or any articles manufactured or derived from any form of plastic materials, etc. The directors are: George H. Rolls, 'Peregrine,' Enhorne, Newbury, and John L. Rolls, 121 Bartholomew Street, Newbury. Regd. office: 121 Bartholomew Street, Newbury.

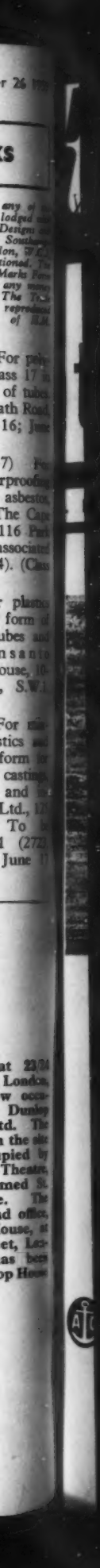
TRADE MARKS

Objections to the registration of any of undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

LUXOTHENE (785,069) For plastics; thene plastics included in Class 17; the form of sheets, films and of tubes. By British Cellophane Ltd., Bath Road, Bridgwater, Somerset. (Class 16; June 10 1959.)

CAPOPLASTIC (785,257) For packing, sealing and waterproofing material made principally of asbestos being plasticised goods. By The Cape Asbestos Co. Ltd., 114 and 116 Piccadilly Street, London, W. To be associated with No. 472,151 (2529, 2104). (Class 16; June 10 1959.)

POLYLITE (786,244) For plastics included in Class 17 in the form of sheets, slabs, blocks, rods, tubes and shaped sections. By Monsanto Chemicals Ltd., Monsanto House, 18 Victoria Street, London, S.W.1. (Class 16; June 10 1959.)

PERMACAST (782,755) For mixtures of synthetic resin plastics and fillers in powder or fibrous form for use in the manufacture of castings, pressings and of mouldings and included in Class I. By Permali Ltd., Bristol Road, Gloucester. To be associated with No. 511,891 (272,887) and others. (Class 1; June 1959.)

New offices at 23/24 King Street, London, S.W.1, are now occupied by the Dunlop Rubber Co. Ltd. The offices, built on the site formerly occupied by the St. James's Theatre, have been named St. James's House. The company's head office, St. James's House, at 25 Ryder Street, London, S.W.1, has been renamed Dunlop House